



*(University of Choice)*

**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)**

**MAIN CAMPUS**

**UNIVERSITY EXAMINATIONS  
2022/2023 ACADEMIC YEAR**

**THIRD YEAR SECOND SEMESTER EXAMINATIONS**

**FOR THE DIPLOMA  
OF  
MEDICAL BIOTECHNOLOGY SCIENCES  
MAIN EXAMINATION**

**COURSE CODE : BBD 322**

**COURSE TITLE: EXPERIMENTAL ANIMAL SCIENCE**

**DATE: 20<sup>TH</sup> APRIL 2023**

**TIME: 8.00 – 11.00AM**

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**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. Which of the following clearly defines what a laboratory animal is;
  - A. defined as any vertebrate animal (i.e., traditional laboratory animals, agricultural animals, wildlife, and aquatic species) produced for or used in research, testing, or teaching.
  - B. defined as any reptile animal (i.e., traditional laboratory animals, agricultural animals, wildlife, and aquatic species) produced for or used in research, testing, or teaching.
  - C. defined as any animal produced for or used in generation of genetically modified foods.
  - D. All of the above.
2. Which of the following is a standard or guideline that specifies in detail a method, technology, or technique for achieving a desired outcome; it does not provide for modification in the event that acceptable alternative methods are available or unusual circumstances arise;
  - A. Performance standard
  - B. Practice standard
  - C. Engineering standard
  - D. The animal care and use program
3. Which of the following is a standard or guideline that, while describing a desired outcome, provides flexibility in achieving this outcome by granting discretion to those responsible for managing the animal care and use program;
  - A. Performance standard
  - B. Practice standard
  - C. Engineering standard
  - D. The animal care and use program
4. Which one of the following refers to the application of professional judgment by qualified, experienced individuals to a task or process over time, an approach that has been demonstrated to benefit or enhance animal care and use;
  - A. Performance standard
  - B. Practice standard
  - C. Engineering standard
  - D. The animal care and use program
5. Which of the following is not true about ethics and animal use;
  - A. The decision to use animals in research requires critical thought, judgment, and analysis.
  - B. Using animals in research is a privilege granted by society to the research community with the expectation that such use will provide significant new knowledge.
  - C. Animals are used because they are cheap and easily accessible.
  - D. Use of animals is expected to lead to improvement in human and/or animal well-being.
6. Which of the following comprises of all activities conducted by and at an institution that have a direct impact on the well-being of animals, including animal and veterinary care, policies and procedures, personnel and program management and oversight, occupational health and safety, institutional animal care and use committee (IACUC) functions, and animal facility design and management;
  - A. Animal care
  - B. Animal care and use program
  - C. Humane care
  - D. Laboratory Science
7. Which of the following statements closely describes a microenvironment;
  - A. The physical environment of the secondary enclosure, such as a room, a barn, or an outdoor habitat.
  - B. Is the physical environment immediately surrounding it; that is, the primary enclosure such as the cage, pen, or stall.
  - C. Both A and B
  - D. None of the above

8. Which of the following is false about ventilation and air quality for experimental animals;
  - A. ventilation provides an adequate oxygen supply.
  - B. removes thermal loads caused by the animals, personnel, lights, and equipment.
  - C. concentrates gaseous and particulate contaminants including allergens and airborne pathogens.
  - D. adjusts the moisture content and temperature of room air; and, where appropriate, creates air pressure differentials (directional air flow) between adjoining spaces.
9. The following factors affect animals' needs for light except;
  - A. light intensity
  - B. wavelength
  - C. the duration of the animal's current and prior exposure to light, t
  - D. Microenvironment temperature
10. Rats and mice generally prefer cages with;
  - A. High light intensity
  - B. Low light intensity
  - C. Can survive in any light intensity
  - D. None of the above
11. Which of the following is true about microenvironment enrichment;
  - A. It involves the placement of a roof on animal housing areas
  - B. Involves placement of light sources in the animal areas
  - C. Involves maintenance of appropriate temperature and humidity in animal resting areas
  - D. Involves provision of sensory and motor stimulation, through structures and resources that facilitate the expression of species- typical behaviors and promote psychological well-being to experimental animals
12. Which of the following refers to practical statements of collective wisdom, convention, or management direction that are internal to the entity;
  - A. Standard operating procedures
  - B. Principles
  - C. Policies
  - D. Procedures
13. The selection of appropriate macro- and micro- environmental temperatures will differ based on a variety of factors, which of the following is not one of the factors;
  - A. species or strain,
  - B. age,
  - C. numbers of animals in the enclosure
  - D. construction of the secondary enclosure
14. Which of the following phenomenon refers to strategies for obtaining comparable levels of information from the use of fewer animals or for maximizing the information obtained from a given number of animals (without increasing pain or distress) so that in the long run fewer animals are needed to acquire the same scientific information;
  - A. Refinement
  - B. Reduction
  - C. Reuse
  - D. Replacement
15. Which of the following is not an example of an enrichment in experimental animals housing;
  - A. perches and visual barriers for nonhuman primates
  - B. elevated shelves for cats and rabbits
  - C. Temperature regulators including Air conditioning systems
  - D. shelters for guinea pigs, as well as manipulable resources such as novel objects and foraging devices for nonhuman.

16. Which of the following is false about sheltered or outdoor housing;
  - A. Should be large enough to accommodate all animals housed in the enclosure,
  - B. Should be accessible at all times to all animals,
  - C. Should have sufficient ventilation
  - D. Should not have absorbent bedding to make it easy for cleaning
17. Under what circumstances should experimental animals be housed singly;
  - A. when justified for experimental purposes
  - B. for provision of veterinary care
  - C. for incompatible animals
  - D. All of the above
18. Which of the following refers to all measures taken to identify, contain, prevent, and eradicate known or unknown infections that may cause clinical disease or alter physiologic and behavioral responses or otherwise make the animals unsuitable for research;
  - A. Quarantine
  - B. Animal Biosafety
  - C. Animal Biosecurity
  - D. Bio-risk
19. Which of the following is a category of a surgical procedure;
  - A. Minor
  - B. Survival
  - C. Non-survival
  - D. All of the above
20. Which of the following is true about pain;
  - A. Is an aversive state in which an animal fails to cope or adjust to various stressors with which it is presented.
  - B. Is a stressor and, can lead to acceptable levels of stress and distress in animals.
  - C. Is a complex experience that typically results from stimuli that damage or have the potential to damage tissue; such stimuli prompt withdrawal and evasive action.
  - D. All of the above

**SECTION B: Short Answer Questions (40 Marks)**

1. Describe the important considerations for determining the space needs for experimental animals (8marks)
2. Explain the procurement of experimental animals (8marks)
3. Describe the medical management of laboratory animals (8marks)
4. Differentiate between microenvironment and macroenvironment (8marks)
5. Explain the separation of experimental animals by health status and species (8marks)

**SECTION C: Long Answer Questions (60 Marks)**

1. Describe the 3Rs in Experimental Animal Science (20marks)
2. Describe the U.S. Government Principles for Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training (20marks)
3. Describe the elements of a successful animal biosecurity program (20marks)