



(University of Choice)

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

(MAIN CAMPUS)

**UNIVERSITY EXAMINATIONS (MAIN PAPER)
2021/2022 ACADEMIC YEAR**

THIRD YEAR FIRST TRIMESTER EXAMINATIONS

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

COURSE CODE: BML 423

COURSE TITLE: EXPERIMENTAL ANIMAL SCIENCE

DATE: 26/04/2022

TIME: 12.00 -2.00 PM

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

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This Paper Consists of 5 Printed Pages. Please Turn Over

SECTION A: Multiple Choice Questions (MCQs)

1. In general, dry-bulb temperatures in animal rooms should be set:
 - A. Below upper critical temperatures
 - B. Below lower critical temperature
 - C. At the animal normal Body temperature
 - D. Ambient temperature
2. What is the acceptable range of relative humidity for most experimental mammalian animal species?
 - A. 10% to 30%
 - B. 30% to 70%
 - C. 70% to 80%
 - D. 90%
3. For group-housed mice weighing more than 25g, the recommended floor area/mouse is
 - A. 38.7 cm²
 - B. 51.6 cm²
 - C. 77.4 cm²
 - D. ≥96.7 cm²
4. All non-terminal blood sample collection from normal adult and healthy experimental rodents without replacement of fluids should on a single occasion NOT exceed:
 - A. 10% of total circulating blood volume
 - B. 5% of total circulating blood volume
 - C. 30% of total circulating blood volume
 - D. 50% of total circulating blood volume
5. The average normal blood volume of adult rat is:
 - A. 5-6 ml/kg
 - B. 50-70 ml/kg
 - C. 10-20 ml/kg
 - D. 100 ml/kg
6. The lifespan of mice is:
 - A. 1-3 years
 - B. 1 year
 - C. 5 years
 - D. 3 months
7. The normal mouse heart rate is:
 - A. 100-120 beats per minute
 - B. 310-840 beats per minute
 - C. 80 beats per minute
 - D. 80-230 beats per minute
8. The gestation period of rats is:
 - A. 21-23 days
 - B. 30 days
 - C. 42 days
 - D. 51 days
9. Which of the following volumes can be injected intramuscularly into mice safely (based on 25 g mouse)?
 - A. 2-3 ml
 - B. 0.05-0.1 ml (0.03 ml per site)
 - C. 0.50
 - D. 2-6 ml

10. Which of the following is a recommended opioid analgesic that can be used to treat post-operative pain in laboratory rodents
- A. Ketamine
 - B. Xylazine
 - C. Acepromazine
 - D. Buprenorphine
11. The ambient temperature range in which thermoregulation occurs without the need to increase metabolic heat production or activate evaporative heat loss mechanisms in animals is known as:
- A. Upper critical temperatures
 - B. Lower critical temperature
 - C. Normal Body temperature
 - D. Thermoneutral zone (TNZ)
12. What is the general recommended dry-bulb macro-environmental temperature for non-human primates?
- A. 20-26 °C
 - B. 16-22 °C
 - C. 18-29 °C
 - D. 16-27 °C
13. Non-terminal blood sample collection from experimental rodents can be ideally repeated
- A. After 3 to 4 weeks
 - B. Every day
 - C. Every week
 - D. Twice a week
14. Which of the following blood collection site is ideal for the guinea pig?
- A. Tail
 - B. Orbital sinus
 - C. Jugular vein
 - D. Tarsal vein
15. What is the normal mouse weight at birth?
- A. 1-2 g
 - B. 5g
 - C. 10g
 - D. <1g
16. The gestation period of mice is:
- A. 19-21 days
 - B. 30 days
 - C. 42 days
 - D. 51 days
17. Young mice are weaned how many days after birth.
- A. 21 days
 - B. 120 days
 - C. 1 year
 - D. 10 days

18. Which of the following volumes can be injected into mice safely (based on 25 g mouse) intraperitoneally?
- A. 2-5 ml
 - B. 0.05-0.1ml
 - C. 0.50 ml
 - D. 2-3 ml
19. The average lifespan of rats is:
- A. 2.5-3.5 years
 - B. 1 year
 - C. 5 years
 - D. 3 months
20. The average normal blood volume of adult rat is:
- E. 5-6 ml/kg
 - F. 50-70 ml/kg
 - G. 10-20 ml/kg
 - H. 100ml/kg

Section B: SAQs (40 marks)

1. Describe the concept of **three Rs** and its importance in designing experimental animals-based research **(9 marks)**
2. Outline five signs of chronic pain in laboratory mice **(5 marks)**
3. Describe four different types of diets used that are used to feed experimental animals **(8 marks)**
4. List **SIX** factors that can cause marked variation of temperature and relative humidity between primary and secondary animal enclosures as well as within primary enclosures **(6 marks)**
5. Describe the importance of providing adequate and appropriate contact bedding for experimental rodents **(5 marks)**
6. Describe signs of inadequate anaesthesia in laboratory rodents **(5 marks)**
7. Name two common diseases of laboratory rat **(2 marks)**

Section C: Long essay questions (60 marks)

1. Discuss the following aspects of laboratory mice; taxonomy, physiology, housing, feeding, diseases and their main uses in biomedical research **(20 marks)**
2. Discuss the following aspects of laboratory guinea pigs; taxonomy, physiology, housing, feeding, diseases and their use in biomedical research **(20 marks)**
3. Discuss four methods of anaesthesia that are used to anaesthetise experimental animals during operative procedure **(20 marks)**