

Candidate Number: .....

# **The Institute of Animal Technology**



## **MEMBERSHIP EXAMINATION 2005**

### **Section A - ANIMAL TECHNOLOGY**

**Morning, Wednesday 15<sup>th</sup> June**

**(TOTAL TIME: 3 HOURS)**

#### **Part I**

**Short Answer Questions**

***(One half of the total marks)***

#### **Part II**

**Long Answer Questions**

***(One half of the total marks)***

*Write your candidate number at the top of this cover*

*Read the instructions for each part carefully*

# ***Part I***

## ***Attempt ALL Questions***

***You are advised to spend one and a half hours on this part***

***Write your answers in the spaces provided***

***Numbers in brackets indicate the marks available for each question***

***Hand in this book, together with your answers for Part II,  
at the end of the examination***

1. For each of the following criteria, give **two** examples of methods for identifying individual animals that:

a) are non-invasive

.....

.....

b) are invasive

.....

.....

c) can be used with unlimited numbers of animals

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.....

d) are limited in the numbers that they can identify

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.....

e) are not permanent

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(5)

2. Give **two** reasons for the use of cryopreservation.

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(4)

3. Briefly describe **five** ways in which the design of a 'Specific Pathogen Free' facility differs from that of a 'Containment Facility'.

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(5)

4. Complete the following passage;

An adult female Sprague Dawley rat will ovulate every \_\_\_\_\_ and will remain in oestrus for \_\_\_\_\_. Behavioural signs that she is in oestrus are \_\_\_\_\_ and \_\_\_\_\_. Although female rats are capable of breeding at \_\_\_\_\_ weeks, they would not normally be mated until they reach \_\_\_\_\_ weeks of age. A common method of confirming pregnancy in a female rat is \_\_\_\_\_. Pups will be born \_\_\_\_\_ days after a successful mating and litter size will usually be \_\_\_\_\_ pups. The pups are usually weaned at \_\_\_\_\_ days of age and should weigh approximately \_\_\_\_\_.

(5½)

5. Complete the following table.

Animal	Weaning weight	Full adult weight	
		Male	Female
Mouse Inbred			
Rat Outbred			
Guinea pig			
Rabbit (New Zealand White)			

(6)

6. Define the following terms with regard to the breeding of laboratory animals.

a) Permanent pair

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 .....

b) Arranged mating

.....  
 .....

c) Permanent harem

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 .....

d) Artificial insemination

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 .....

(8)

7. Complete the following table.

Adult of each Species	Daily dry diet intake ( g )	Daily water intake ( cm <sup>3</sup> )
Rat		
Mouse		
Syrian hamster		
Guinea pig		
Rabbit (New Zealand White)		
Dog (Beagle)		

(6)

8. Name the inorganic elements required in the diet for each of the following:

a) Development and maintenance of bone

.....

.....

b) Synthesis of haemoglobin

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c) Hardening tooth enamel

.....

d) Synthesis of thyroxine

.....

e) Blood coagulation

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(6)

9. Briefly describe **one** method to monitor each of the following environmental conditions.

a) Microbiological load

.....  
.....  
..... (2)

b) Room Air Change Rate

.....  
.....  
..... (3)

c) Relative humidity

.....  
.....  
..... (1)

d) Atmospheric pressure differentials

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.....  
..... (2)

10. Give **three** examples of diseases in animals that are **not** caused by infectious agents.

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.....  
..... (3)

**11.** List **four** routes by which an infectious agent may enter an animal's body.

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(2)

**12.** Explain why the filtration of air delivered to controlled environments is usually undertaken using three grades of filter.

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(3)

**13.** List **six** factors that can adversely affect the efficiency of a chemical disinfectant.

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(3)

**14.** A member of staff in a barrier maintained unit, which operates a **48** hour exclusion rule for people from other units, wishes to visit a conventional unit to practice their handling and sexing technique.

Which is the best day to do this and why?

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.....

(1½)

15. List **four** items that can be routinely screened to monitor the microbiological integrity of the barrier.

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(2)

16. From the following list put a cross (X) against one size of syringe and one size of needle you would select for administering an intravenous injection to a 325g rat at a dosage volume of 0.8cm<sup>3</sup>/100g.

1cm <sup>3</sup> syringe .....	19G x 1 ½ " needle .....
2cm <sup>3</sup> syringe .....	21G x 1 ½ " needle .....
5cm <sup>3</sup> syringe .....	23G x 1 " needle .....
10cm <sup>3</sup> syringe .....	26G x ½ " needle .....

(1)

17. You have been asked to administer 5.0 IU of Pregnant Mare Serum Gonadotrophin (PMSG) to each of **twenty** mice.  
The PMSG is at a concentration of 1.0 IU/1.0µl and each vial contains 50 IU.  
The volume required to fill the needle is 2.0µl.

Using a new needle for each animal:

a) How many vials are required?

b) What volume of PMSG will be left over in the last vial?

**(Show all calculations)**

(4)

- 18.** Give **four** factors relating to the properties of a substance that need to be considered when preparing it for administration to an animal.

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(4)

- 19.** Briefly explain how using a metabolism cage aids the accurate measurement of food and water intake.

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(4)

- 20.** Briefly describe how you would prepare the skin of an animal at the site of an abdominal operation.

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(2)

- 21.** Give **five** reasons why it is beneficial to pre-medicate a cat prior to inducing general anaesthesia for a surgical operation.

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(5)

**22.** What are the **three** basic objectives of balanced anaesthesia?

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(3)

**23.** What effect does a neuro-muscular blocking agent have when administered to an animal?

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(1)

**24.** Give **three** ways in which a local anaesthetic may be administered.

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(3)

**25. a)** What do you understand by the term hypothermia?

.....

.....

**b)** How would you prevent this in an animal following a surgical procedure?

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(2)

**26.** In general, how long after a surgical procedure would you expect to remove sutures?

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(1)

**27.** List **ten** factors which might influence your choice of method for carrying out euthanasia of laboratory animals.

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(5)

**28.** List **four** methods you could use to confirm the death of a laboratory animal.

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.....  
(2)

**Questions 29-32 relate to the Animals (Scientific Procedures) Act 1986**

**29.** With reference to the Act define the following terms.

a) Regulated procedure.

.....

.....

**(4)**

b) Protected animal.

.....

.....

**(2)**

c) Severity limits.

.....

.....

**(2)**

**30.** Complete the table to name either an animal or a method of euthanasia (different for each) as described in Schedule 1 of the Act.

<b>Animal</b>	<b>Method</b>
<b>1.0kg rabbit</b>	
	<b>Dislocation of neck</b>
	<b>Rising concentration of carbon dioxide gas</b>
<b>Cow</b>	
<b>Horse</b>	

**(2½)**

**31.** With reference to the Act list all the species named in Schedule 2.

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(4)

**32.** With reference to the Act explain the purpose of Schedule 2.

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(2)

**33.** With reference to Good Laboratory Practice regulations, define the following terms.

a) Standard Operating Procedures.

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(2)

b) Test substance.

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(2)

c) Non-clinical laboratory study.

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(2)

d) Quality control.

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(2)

e) Raw data.

.....  
 .....  
 (2)

f) Archives.

.....  
 .....  
 (2)

**34.** Give the different stages a Standard Operating Procedure should go through before it is accepted as a working document.

.....  
 .....  
 .....  
 .....  
 .....  
 .....  
 (8)

**35.** Complete the following table.

Animal	Duration of Oestrous cycle	Gestation period	Weight at birth	Weaning age
Hereford Cow				
Large White Sow				
Suffolk Ewe				
Toggenberg Goat				

(8)

**36.** State **three** methods of ascertaining that mating has occurred in farm animals.

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.....  
.....  
(3)

37. List **six** factors to be considered when transporting farm animals within Mainland Britain.

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.....  
(3)

38. Give **five** criteria for the selection of eggs suitable for incubation.

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.....  
.....  
.....  
(2½)

39. State **two** factors that influence the onset of egg laying in a flock of pullets.

.....  
.....  
(1)

40. Name **three** methods for housing poultry.

.....  
.....  
.....

(1½)

**41.** Why is grit added to a diet of laying domestic poultry?

.....  
.....

(½)

***End of Part I***



## ***Part II***

### ***Attempt THREE Questions from five***

***This part should take approximately one and a half hours to  
complete***

***Equal marks are available for each question***

***The approximate percentage of marks available  
for each section of the question is indicated***

***Start each new answer on a fresh sheet of paper  
Write on one side of the paper only***

***Write your candidate number in the top right hand corner and the  
question number in the top left hand corner of every answer sheet***

***Credit will be given for diagrams which make your answer clearer***

***You must hand in all answer sheets together with this book  
at the end of the examination***

***Attempt THREE questions***

**1.** Describe how the use of environmental enrichment may be limited by;

- |     |                         |            |
|-----|-------------------------|------------|
| (a) | Experimental design     | <b>40%</b> |
| (b) | Routine care procedures | <b>40%</b> |
| (c) | Cost                    | <b>20%</b> |

**2.** You have been asked to perform a short absorption study. Three study groups each comprising ten mice are to receive test materials A, B and C administered by oral gavage.

Blood samples are to be collected at 1, 2, 4, 8 and 24 hours post dosing, with two mice from each group being sampled at each time point to obtain a pooled 0.4cm<sup>3</sup> clotted sample.

All animals are to be sacrificed 48 hours post dosing and subjected to a full pathological examination.

Under the following headings discuss the factors that must be considered for:

- |     |  |            |
|-----|--|------------|
| (a) | detailed licensing requirements          | <b>30%</b> |
| (b) | dosing and blood sampling schedules      | <b>40%</b> |
| (c) | post dose monitoring and welfare aspects | <b>30%</b> |

**3.** You are choosing a diet to offer to a breeding colony of non-inbred rats.

Under the following headings explain those characteristics of the diet that you would consider before making a decision.

- (a) Nutritional properties **50%**
- (b) Physical form of the diet **15%**
- (c) Other considerations **35%**

**4.** An infectious viral disease has been discovered in a rodent breeding colony in your unit. Describe the steps you would take to:

- (a) prevent spread to other parts of the unit **50%**
- (b) eliminate the disease from the area **50%**

**5.** With reference to the Animals (Scientific Procedures) Act 1986;

- (a) Describe the purpose and function of the Ethical Review Process. **75%**
- (b) Describe the contribution the Named Animal Care and Welfare Officer (NACWO) may make to the Ethical Review Process. **25%**

***End of Part II***