

Candidate Number:

The Institute of Animal Technology



MEMBERSHIP EXAMINATION 2002

Section A - ANIMAL TECHNOLOGY

Morning, Tuesday 11th June

(TOTAL TIME: 3 HOURS)

Part I

Short Answer Questions

(One third of the total marks)

Part II

Long Answer Questions

(Two thirds 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 hour 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***

Attempt ALL parts

1. a) List **five** factors that affect the efficiency of fumigants.

- i).....
- ii).....
- iii).....
- iv).....
- v).....

(2½)

b) A 40% solution of formaldehyde (formalin) is used at a rate of 0.5ml in 100ml water per 0.25m³.

How much formalin is required to disinfect a room measuring 10 metres long x 8 metres wide x 3 metres high?

(Show your workings)

(2)

2. Define the following terms.

a) Gnotobiotic

-
 -
- (1)**

b) Specified Pathogen Free

-
 -
- (1)**

3. Complete the following table.

GROUP	DISADVANTAGES	USES	EXAMPLE (not a trade name)
Phenols	Poor virucidal and sporocidal activity Tendency to be bacteriostatic Activity reduced in the presence of organic matter and oils Toxic	Footbaths Dunktanks	Lysol
Halogens			
Alcohols			
Aldehydes			

(4½)

4. What is measured and determined by an “in use test” on a disinfectant?

.....

(1½)

5. Give **four** factors that must be considered when choosing a method of euthanasia. In each case give a reason for your answer.

i).....

ii).....

iii).....

iv).....

(6)

6. State **one** possible cause of each of the following which could be found in incubated chicken eggs;

a) Blood rings

..... (1)

b) Clear eggs

..... (1)

c) Dead chick inside complete egg

..... (1)

d) Pipped egg not hatching

..... (1)

7. Fill in the gaps;

Fertilised domestic chicken eggs take _____ days to incubate. A _____ hen will incubate the eggs beneath her. If she senses that they are too _____ she will stand over them, if she thinks they are too _____ she will sit tightly upon them. She will turn eggs about every _____ hours. _____ incubation is the most commonly used method for hatching chicks today. The incubator's temperature should be set at _____ degrees C, the relative humidity is set to _____ %. During the first _____ days it is important that the eggs are _____ regularly. For the last _____ days of incubation, the temperature in the incubator should be adjusted to _____ degrees C and the relative humidity reset to _____ %.

(6½)

8. a) Complete the following table.

Species	How long before surgery requiring general anaesthesia should food be withdrawn?
Cat	
Chicken	
Cow	

(1½)

b) Why is withholding food prior to such surgery necessary? Give a different reason for each of the species.

Cat.....

Chicken.....

Cow.....

(3)

c) Give **two** reasons why food is not usually withheld from rodents prior to such surgery.

i).....

ii).....

(1)

9. Is it necessary to withhold water from an animal before surgery requiring a general anaesthetic? Give a reason for your answer.

.....

.....

(1)

10. Why might the anaesthetic agents, ketamine and halothane (or isoflurane) be used *in combination* for a primate?

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

11. State **three** benefits of using an endo-tracheal tube rather than a face mask when maintaining anaesthesia in a dog.

i).....
ii).....
iii).....
(3)

12. Give **four** reasons why diethyl ether might be a poor choice of gaseous anaesthetic agent compared to other volatile agents such as halothane or isoflurane?

i).....
ii).....
iii).....
iv).....
(4)

13. Why were Standard Operating Procedures introduced?

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

14. List **ten** factors that should be considered when designing a Standard Operating Procedure (SOP) for the use of an animal weighing balance.

i).....

- ii).....
 - iii).....
 - iv).....
 - v).....
 - vi).....
 - vii).....
 - viii).....
 - ix).....
 - x).....
- (5)

15. List **ten** items of information that should be readily available to animal unit staff about animals undergoing scientific procedures.

- i)
- ii)
- iii)
- iv)
- v)
- vi)
- vii)
- viii)
- ix)
- x)

(5)

16. Give **six** factors which may affect the body temperature of laboratory mammals.

- i).....

- ii).....
 - iii).....
 - iv).....
 - v).....
 - vi).....
- (3)**

17. List **six** factors that may **adversely** affect the successful collection of a blood sample from a laboratory animal.

- i).....
.....
 - ii).....
.....
 - iii).....
.....
 - iv).....
.....
 - v).....
.....
 - vi).....
.....
- (3)**

18. a) Complete the table to indicate your preferred routes for the withdrawal of blood samples from adult laboratory animal species.

SPECIES	PREFERRED ROUTE
Mouse	
Guinea-pig	
Rabbit	
Cat	
Chicken	
Sheep	

(3)

b) For each of the species listed below give **three** factors which influenced your choice of method.

Mouse.....

.

.....

.....

Guinea-pig.....

.....

.....

Rabbit.....

.....

.....

(9)

Questions 19-23 relate to the Animals (Scientific Procedures) Act 1986

19. The Act permits the conduct of regulated procedures only when **three** specific requirements have been met. What are they?

i).....

ii).....

iii).....

(3)

20. A NACWO has correctly determined that the following procedures are **NOT** regulated. In each case give the reason why the NACWO has reached that conclusion.

a) Propagation of influenza virus by inoculation of embryonated avian eggs and subsequent harvest of virus;

.....

.....

(1)

b) Euthanasia of calves on completion of a metabolism study using a captive bolt humane killer:

.....

.....

(1)

c) Withdrawal of samples of blood from a group of sentinel rats;

.....

.....

(1)

d) The removal of a small piece of tissue from one ear of a mouse;

.....

.....

(1)

21. Identify the individual accountable under the Act for each of the following:

a) Maintaining records of the acquisition, use and disposal of animals;

.....

(1/2)

- b) Providing the Home Office with information about the procedures started during each calendar year (the Return of Procedures);

..... (1/2)

- c) Obtaining veterinary advice for an animal undergoing regulated procedures;

..... (1/2)

- d) Reporting incidences of non-compliance with the provisions of the Act to the Secretary of State;

..... (1/2)

22. After undertaking one of the appropriate methods of humane killing, Schedule 1 requires that the process of euthanasia is ensured in one of **six** ways. Name them.

- i).....
- ii).....
- iii).....
- iv).....
- v).....
- vi).....

(3)

23. With reference to Schedule 2 of the Act:

- a) Name the **two** species that must normally be obtained only from a designated breeding establishment.

.....

(1)

b) Name the **one** avian species included.

.....
(1/2)

c) Under what circumstances are pigs and sheep included?

.....
.....
(1/2)

d) Name the **five** rodent species included.

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

24. Define the term 'zoonosis'.

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

25. Name a zoonotic disease for each of the following species (**different in each case**).

- a) Ferret..... (1/2)
- b) Sheep..... (1/2)
- c) Non-human primate..... (1/2)
- d) Dog..... (1/2)

26. What is meant by the term "prophylactic treatment"?

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

Give **two** examples of prophylactic treatment.

i).....

ii).....

(1)

27. Explain briefly the meaning of the following terms within the context of an infectious disease:

a) Virulence

.....

.....

(1)

b) Pathogenesis

.....

.....

(1)

c) Incubation

.....

.....

(1)

d) Sequelae

.....

.....

(1)

28. Define the following terms;

a) Microenvironment

.....

.....

(1)

b) Macroenvironment

.....
.....

(1)

29. Give **four** procedures performed when packaging diet for subsequent irradiation. In each case give a reason.

i).....
.....
.....

ii).....
.....
.....

iii).....
.....
.....

iv).....
.....
.....

(6)

30. What is the standard dose of gamma-irradiation used to sterilize material entering a Specified Pathogen Free Unit?

.....

(1/2)

31. Why might an ultra high efficiency air filter be fitted to the extract ventilation system of a Specified Pathogen Free Unit?

.....

..... (1)

32. Define the term “essential amino acid”.

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

33. Why do most proprietary diets contain more than one cereal component?

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

34. A proprietary diet is stated to contain 20% of protein, and has an energy content of 22.5MJ/kg. If protein provides 17kJ of energy per gram, what percentage of the energy in the diet is provided by the protein?
(Show your workings)

(3)

35. Complete the following table.

Species	Length of Oestrous Cycle	Gestation Period	Average Litter Size Born	Recurrence of Oestrus
Cow				
Sheep				
Pig				
Goat				
Horse				

(10)

36. List a suitable method for the individual identification of the following species (different in each case).

a) **Fifty** ferrets

.....
(1/2)

b) **Thirty** black mice

.....
(1/2)

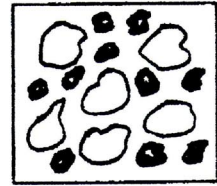
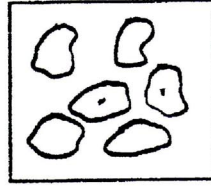
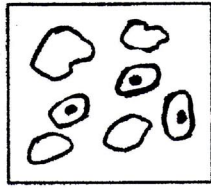
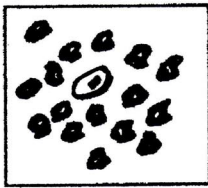
c) **Twenty** albino guinea pigs

.....
(1/2)

d) **Five** marmosets

.....
(1/2)

37. Identify the **four** stages of the oestrous cycle that are represented in the boxes below.



.....

.....

.....

.....

(2)

38. With reference to breeding laboratory animal species define the following terms.

a) Inbreeding depression

.....

.....

(2)

b) Outbred strain

.....

.....

(2)

c) Nucleus colony

.....

.....

(2)

d) Economic breeding life

.....

.....

(2)

End of Part I

Part II

Attempt FOUR Questions from six

This part should take approximately two 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 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***

Please turn over →

Attempt FOUR questions

- 1.** Under the following headings describe the factors that should be considered when choosing between monogamous pairs and permanent harems for a breeding system for a strain of mice.
 - (a) Productivity. **35%**
 - (b) Cost. **25%**
 - (c) Records. **25%**
 - (d) Genetic monitoring. **15%**

- 2.** Describe how the barrier of a Specified Pathogen Free Unit is achieved and/or maintained by the following:
 - (a) Design of the building. **40%**
 - (b) Ventilation system. **35%**
 - (c) Placental barrier **25%**

- 3.**
 - a) Why is it important to regulate the environment of laboratory animals? **25%**
 - b) With regard to laboratory rats and mice, under the following headings explain the optimum levels for each environmental variable and how fluctuations could adversely affect them.
 - i) Heating, ventilation and air conditioning. **40%**
 - ii) Lighting. **15%**
 - iii) Noise. **20%**

4. (a) Explain the principal difference between a direct and an indirect parasitic life cycle. 15%
- (b) Describe the life cycle of the common liver fluke (*Fasciola hepatica*). 40%
- (c) Using your knowledge of the life cycle explain how *Fasciola hepatica* infestation may be controlled. 45%
5. The Animals (Scientific Procedures) Act 1986 requires every designated establishment to have at least one person responsible for the day to day care of protected animals (a 'Named Person').
- (a) What does the Act specifically require a Named Person to do if the health or welfare of a protected animal gives rise to concern? 15%
- (b) Describe the other duties of the Named Animal Care and Welfare Officer (NACWO). 35%
- (c) Outline the knowledge and experience required to undertake the duties of the NACWO. 50%
6. (a) Write short notes on the following aspects of pre-operative preparation of animals for experimental surgery.
- i) Acclimatisation, training and handling of animals. 30%
- ii) Special treatments that are required to prepare animals for surgery. 50%
- (b) For what areas of pre and post-operative care would it be important to obtain instructions? 20%

End of Part II