The Institute of Animal Technology

CERTIFICATE EXAMINATION 2002

Section B – BIOLOGY

Afternoon, Wednesday 12th June

(TOTAL TIME: ONE HOUR)

Short answer questions

Attempt ALL Questions

Write your candidate number at the top of this cover
Numbers in brackets indicate the marks available for each question

1. State **three** environmental conditions necessary for the maintenance of life.

………………………………………………………………………………………………
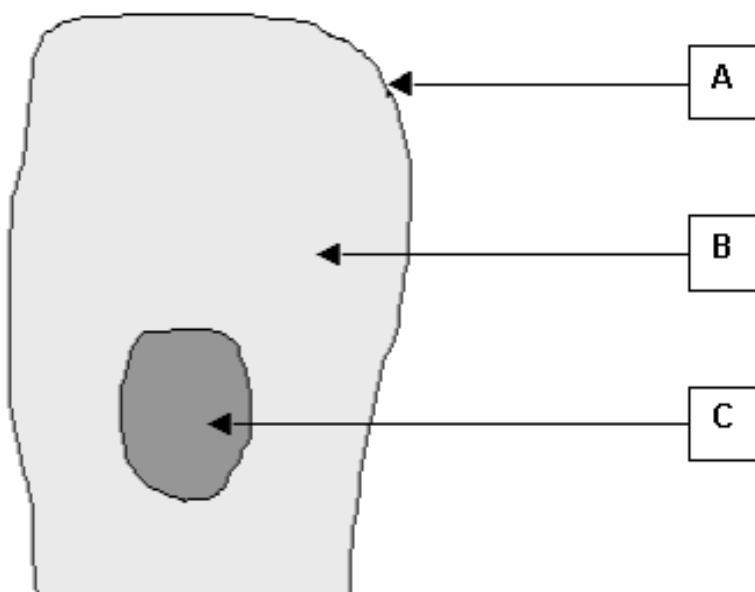……

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………………………………………………………………………………………………
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(3)

2 State **six** processes that characterise a living organism.

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……

(6)

3. Label the diagram below of an animal epithelial cell.

A

(1)

B

C

(1)

………………………………………………..

(1)

5.3 Explain why cell division in mammals is necessary.

………………………………………………………………………………………

………………………………………………………………………………………

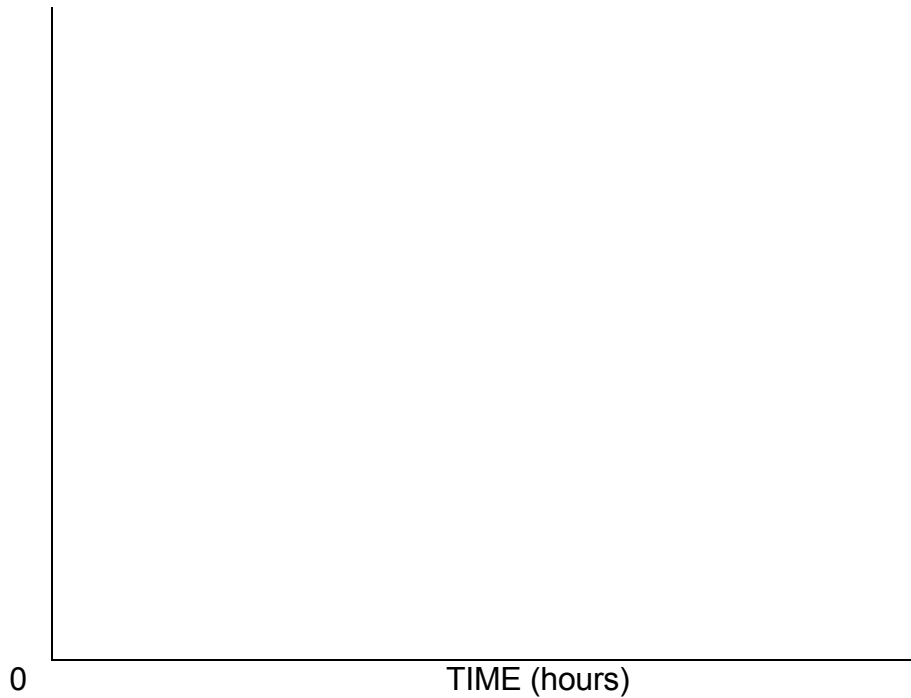**(2)**

4.Draw the typical growth curve of a population of bacteria grown in a nutrient broth on the axes below.

Label the vertical axis and **four** regions of the curve.

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|
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|
|_____
0                 TIME (hours)
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(6)

5.   Define the following:

tissue …………………………………………………………………………..

(2)

organ …………………………………………………………………………..

(2)

body system …………………………………………………………………

(2)

6. Name the part of a mammal's skeleton that:

(a) protects the brain ………………………………..

(b) supports the hind limbs ………………………………..

(c) provides lubricating fluid in joints ………………………………..

(d) provides cushioning at the ends of bone………………………..

(e) prevents dislocation of movable joints ………………………

(5)

7. Complete the table:

Region	Function
	mastication
stomach	primary digestion
duodenum	secondary digestion
caecum	
	main site of nutrient absorption
colon	
	storage of faecal pellets

(5)

8. State the main function of each of the following, giving a **different** answer for each.

	Main Function
carbohydrates	
lipids	
proteins	

(3)

9. What is a vitamin?

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

(3)

10. What is an enzyme?

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

(5)

11. Complete the table giving one example in each box:

	Enzyme that digests	End product of digestion
carbohydrate		
lipid		
protein		

(6)

12. Give **four** functions of the liver.

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………..

………………………………………………………………………………………………..

(4)

13. Give **three** functions of the spleen.

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

(3)

14. Match the statements to blood vessels using the key:

A = arteries   V = veins   C = capillaries.

non-return valves present	
blood under low pressure	
thick wall with muscle	
walls one cell thick	
blood flows in pulses	
blood loses volume	
provide a very large surface area	

(7)

15. The diagram below shows mammalian blood cells.

Cell A   Cell B   Cell C
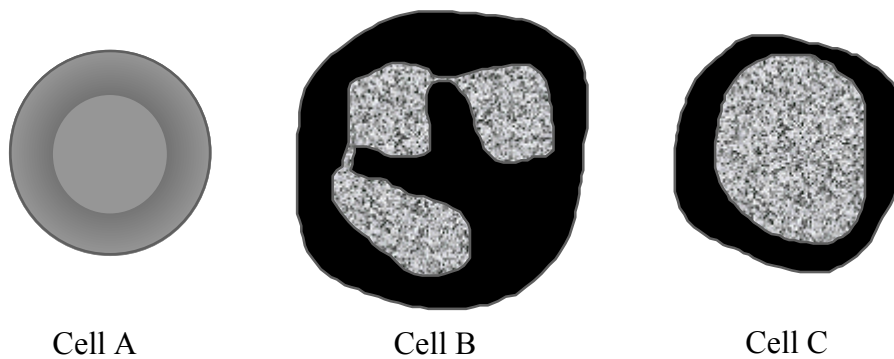
(a) Complete the following sentence to identify the types of cell represented by A and by B and by C:

Cell A is a ....…………….. cell while cells B and C are

.... cells.

(2)

(b) State one function for cell A and one function for cells B and C.

A…………………………………………………………………..

B…………………………………………………………………

(2)

(c) Name the fluid component of mammalian blood.

………………………………………………………………………

(2)

16. Label the structures **A** to **I** on the diagram.
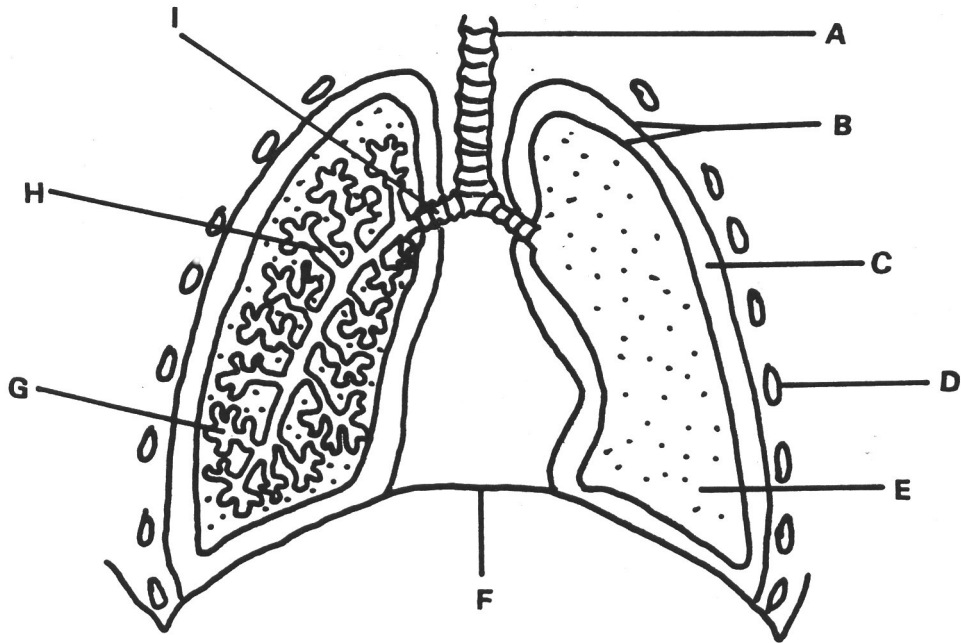
(9)

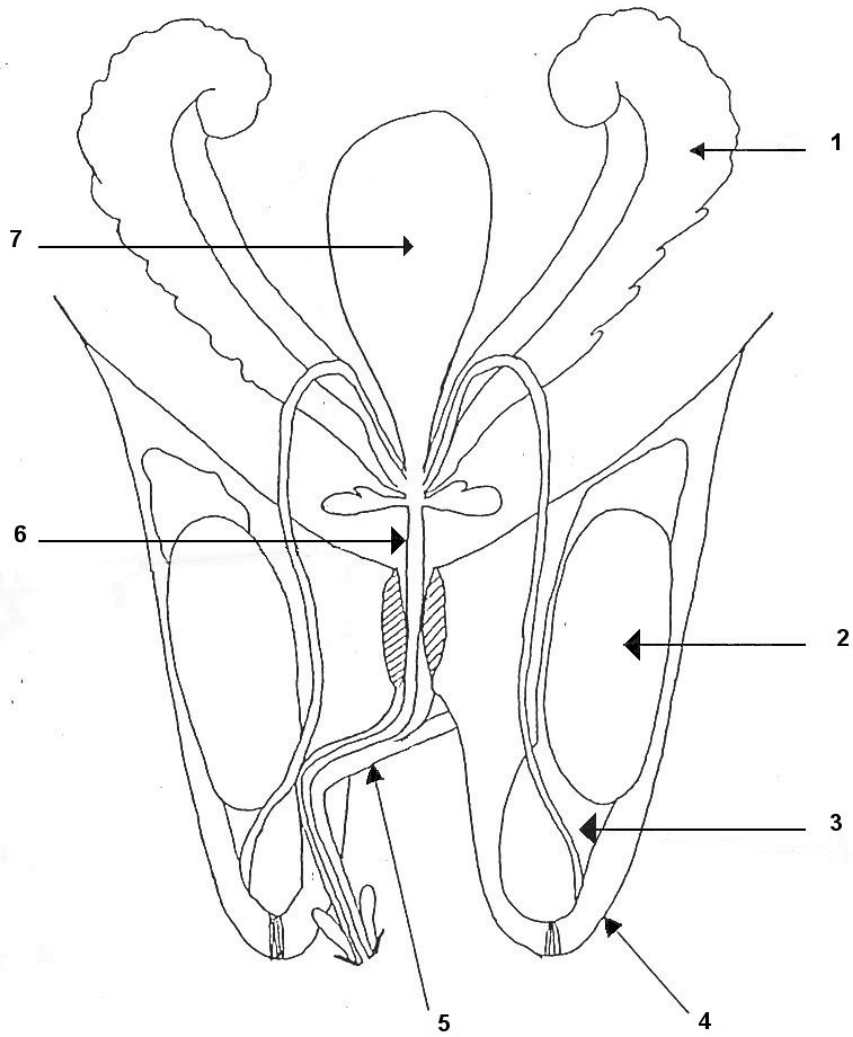**17.** Which **two** organs make up the central nervous system (CNS)?

....

....

(2)

18. Give **four** functions of the CNS.

....

....

....

....

(4)

19. Label the structures indicated as 1 to 7 on the diagram of the urino-genital system of a male rat.

Name the two pairs of structures missing from the diagram.

…………………………………………… and ……………………………………………

(9)

20. Complete the following paragraph by filling in the missing words:

Complex chemicals which circulate in the blood and control the metabolic

functions of cells and tissues are called ....

Some such substances are produced at different stages of development and

include

.... and ………………………… which are secreted by

the

ovaries, thyroxine from the ……………………………. and

…………………………..

from the pituitary gland.

(5)

21. Complete the following paragraph by filling in the missing words:

A mammal maintains constant conditions within its body by means of

.... mechanisms.

The skin plays an important role in keeping body ....

constant. Several components of the skin are involved, including the sweat

glands,

.... vessels, ... and

.... layer. The evaporation of sweat from the surface of

the skin

has a .... effect.

(6)

END

The Institute of Animal Technology

CERTIFICATE EXAMINATION 2002

Section B- MATHEMATICS.

Afternoon, Wednesday 12th June

(TOTAL TIME: 1 HOUR)

Write your candidate number at the top of this cover

Read the instructions for each part carefully

Attempt ALL Questions

Write your answers in the spaces provided

Numbers in brackets indicate the marks available for each question.

You are advised not to spend too much time on any one question.

Show all your workings.

You may use a simple calculator as necessary.

Write your candidate number on all answer sheets.

1. *You are advised to read all of this question before making any attempt.*

   The information below relates to the average body weights (in grams) of a particular strain of mice.

Age (days)	0	10	20	30	40	50
Average body weight of males (g)	1.25	4.2	11.6	21.8	31.0	35.0
Average body weight of females (g)	1.25	3.8	10.0	20.0	26.5	28.0

(a) Plot the growth curves on a suitable graph.

(13)

(b) From your graph, determine the expected average bodyweights of males   and females at 8 days of age.

   Males ………………………..

   Females ……………………..

(4)

(c) Predict the bodyweights of males and females at 8 weeks of age.

   Males ………………………..

   Females ……………………

(4)

2. The following animals are housed in one unit.

     86 mice of approximately 25g bodyweight
    125 mice of approximately 35g bodyweight
     84 rats of approximately200g bodyweight
     72 rats of approximately 300g bodyweight

MC cages are used to house mice at the following densities.
    5 mice at less than 30g or 3 mice at more than30g bodyweight.

RC1 cages are used to house 7 rats of less than250g bodyweight.
RC2 cages are used to house 5 rats of more than 250g bodyweight.

(a) Calculate the total number of cages required to house the mice.

(6)

(b) Calculate the number of RC1 and RC2 cages required to house the rats.

(4)

(c) If the maintenance charges made to projects for each type of cages are:

MC – 25p per week
RC1– 85p per week
RC2 - 90p per week

Calculate the maintenance charge for all the cages for one week.

(5)

(d) If the charges were increased by 12.5%, what would the new weekly total charge?

(4)

3. The diet for guinea pigs is supplied in 25K bags.

Assume: that the guinea pigs require an average of 60g diet/day
Each guinea pig requires 2000 square centimetres of floor area

(a) Calculate the number of bags of diet for 640 guinea pigs for 13 weeks.

(8)

(b) Calculate the number of cages which measure 1 meter by 1.5 meters needed to house the 640 guinea pigs.

(7)

The Institute of Animal Technology

CERTIFICATE EXAMINATION 2002

Section B – PHYSICAL SCIENCE

Afternoon, Wednesday 12th June

(TOTAL TIME: ONE HOUR)

Short answer questions

Attempt ALL Questions

Write your candidate number at the top of this cover

Numbers in brackets indicate the marks available for each question

1. Complete the table with the missing words / symbol / values.

Name	Symbol	Value
micro		10^{-6}
	m	10^{-3}
centi	c	
	k	
mega		10^{6}

(6)

2. Define the following:

Mass ………………………………………………………………………

………………………………………………………………………

Weight ………………………………………………………………………..

………………………………………………………………………

Density ………………………………………………………………………

………………………………………………………………………

(6)

A block of lead has a mass of 44,000 kg and a volume of $4m^3$.

What is the density of lead?

(Show your calculation)

(3)

3. Name, or briefly describe **three** methods of damping balances used for weighing animals.

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

(3)

4. Complete the following:

Atoms consist of shells of…………………..around a nucleus which consists

of …………………………. and………………………..

…………………………………… have a positive charge, …………………………

have a negative charge and ……………………… are neutral.

In a neutral atom there are equal numbers of ………………… and…………….

An ion is formed when an atom gains or loses ……………………..

(9)

5. What is the difference between an atom and a molecule?

……………………………………………………………………………………

……………………………………………………………………………………

(2)

6. The structure of a molecule of water is shown below.

$$O$$
$$H \qquad H$$
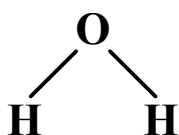
(a) Name the atoms present in water.

……………………………………………………………………………………

(2)

(b) What is the chemical formula of water?

…………………………………………………………………………………… **(1)**

(c) Name the type of bond present between the atoms of water.

…………………………………………………………………………………

(1)

7. Describe the difference between a compound and a mixture.

……………………………………………………………………………..

……………………………………………………………………………..

……………………………………………………………………………..

……………………………………………………………………………..

(4)

8. In what **three** states do pure substances exist?

……………………………………………………………………………..

……………………………………………………………………………..

……………………………………………………………………………..

(3)

9. List **three** factors that affect the solubility of a solid in a liquid.

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

(3)

10. Define the term energy.

……………………………………………………………………………………

(2)

11. Give **five** different examples where energy is converted from one form to another.

Original form of energy	Form after conversion	Where the conversion occurs

(15)

12. Why do materials expand when heated?

…………………………………………………………………………………………..

(2)

13. complete the statements below,

Heat can travel by   …………………………….. ,

…… ....

and   ....

All metals are good ....………........ of heat

while plastics are good ....

(5)

14. Identify the thermometer illustrated below.

………………………………………………………………………………

(1)

Explain what happens when the temperature rises.

…………………………………………………………………………………

…………………………………………………………………………………

(3)

Explain what happens when the temperature falls.

…………………………………………………………………………………

…………………………………………………………………………………

(3)

15. What happens ti an ionic compound when it is dissolved or fused (melted)?

……………………………………………………………………………

(2)

16. Name the ion that acids yield.

………………………………………..

(1)

17. Complete the table with a tick (✓) to show whether solutions of the given pH values are acidic, alkaline or neutral.

pH	acidic	alkaline	neutral
7			
10			
2.5			

(3)

18. Complete the following statement:

ALKALI plus ACID gives ……………… plus …………..

(2)

19. Describe electroplating.

………………………………………………………………………………………

………………………………………………………………………………………

(4)

Give one example of its use.

………………………………………………………………………………………..

(1)

20. Which element combines with food to liberate energy?

………………………..

(1)

21. Complete the following statement:

Iron rusts in the presence of………………….. and ……………………

(2)

22. Give three methods of covering iron to delay rusting.

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

(3)

23. Complete the following table.

Term	Definition	One example
detergent	A substance that will form a stable emulsion between hydrophilic and hydrophobic substances	Soap
hydrophilic substance		
hydrophobic substance		
emulsion		

(6)

24. Complete the following statements:

When some large molecules are formed, e.g. proteins, molecules of water are lost between the reactants, and the process is called

…………………………

When water is replaced into such large molecules the original reactants are reformed and the process is called

…………………………

(2)

END