Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2016

LIFE SCIENCES P1

MARKS: **150**

TIME: **2½ hours**

ILFSCE1

This question paper consists of 15 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Start the answer to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams or flow charts ONLY when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, protractor and a compass where necessary.
11. Write neatly and legibly.
12. Round off all calculations to two decimals after the comma.

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question numbers (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Which ONE of the following is a direct cause of kidney damage?

A High cholesterol
B To little physical exercise
C Drinking hot tea
D High blood pressure

1.1.2 Where does the emulsification of fat occur?

A In the liver
B In the colon
C In the gall bladder
D In the small intestine

1.1.3 What structures increase the surface area of the lungs?

A Alveoli
B Bronchi
C The villi
D The pleural membranes

1.1.4 Malpighian body ...

A consists of a glomerulus and Bowman's capsule.
B is part of Bowman's capsule.
C consists of ciliated tubules.
D consists of Bowman's capsule and a ciliated tubule.

1.1.5 Which of the following occurs during inhalation in a human?

A Pressure within the thoracic cavity decreases
B The lungs become smaller
C The diaphragm relaxes
D Pressure in the abdominal cavity decreases

1.1.6 Which of the following is the correct sequence of activities that occur during kidney functioning?

A Pressure filtration → excretion → re-absorption
B Re-absorption → pressure filtration → excretion
C Excretion → pressure filtration → re-absorption
D Pressure filtration → re-absorption → excretion

1.1.7 Which of the following is a density-dependent factor?

A Drought
B Temperature
C Predation
D Fire

1.1.8 Which ONE of the following methods is regarded as a direct technique to determine population size?

A Census
B Simple sampling
C Mark-recapture technique
D Belt transect technique

1.1.9 Use of different resources or different parts of the same resource by different species within an ecosystem to reduce competition is known as …

A interspecific competition.
B competitive exclusion.
C resource partitioning.
D courtship behaviour.

1.1.10 A decrease in the size of a population is due to …

A migration.
B increased immigration.
C increased emigration.
D an increased birth rate.

(10 x 2) (20)

1.2 Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1–1.2.6) in the ANSWER BOOK.

1.2.1 The maximum number of individuals that can be accommodated by the resources of a particular habitat

1.2.2 The type of plastid that absorbs radiant energy during photosynthesis

1.2.3 Removal of animals from a flock when the population size exceeds the carrying capacity

1.2.4 The kind of competition when individuals of the same species living in the same habitat compete for the same food sources

1.2.5 The functional and structural unit of the human kidney

1.2.6 The ejection of solid waste from the body

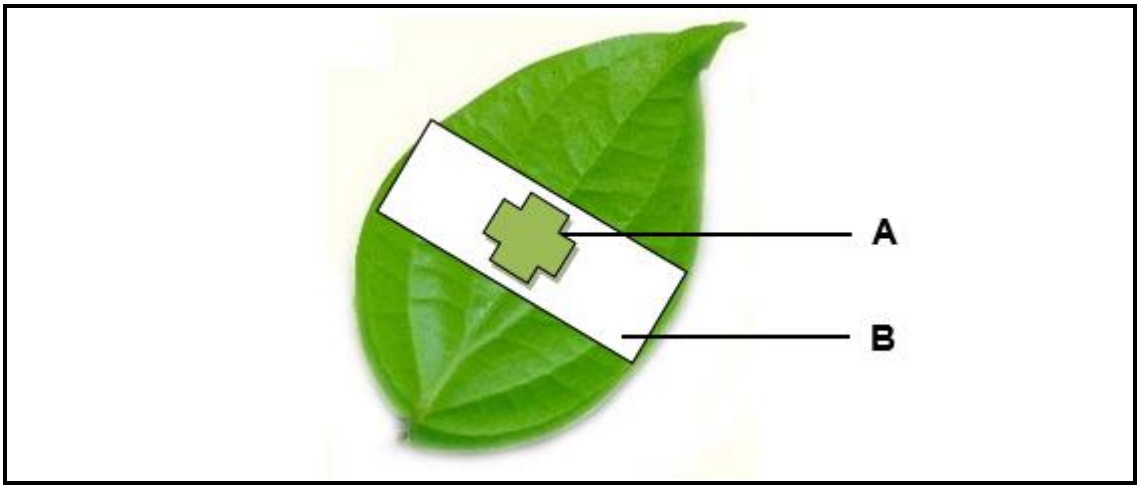
(6 x 1) (6)

1.3 Indicate whether each of the statements in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A and B** or **NONE** of the items in COLUMN II. Write **A ONLY**, **B ONLY**, **BOTH A and B** or **NONE** next to the question number (1.3.1–1.3.7) in the ANSWER BOOK, for example 1.3.8 **B ONLY**.

COLUMN I		COLUMN II
1.3.1	Anaerobic respiration in humans	A: Ethyl alcohol B: Lactic acid
1.3.2	The process whereby excess amino acids are broken down in the liver	A: Detoxification B: Deamination
1.3.3	The social behaviour observed among bees	A: Division of labour B: Hunting in packs
1.3.4	The enzyme secreted by the pancreas	A: Proteases B: Carbohydrases
1.3.5	The disease bilharzia	A: Kidneys B: Lungs
1.3.6	Osmoregulation	A: ADH B: TSH
1.3.7	Conversion of excess glucose to glycogen	A: Insulin B: Glucagon

(7 x 2) (14)

1.4 The diagram below shows how the leaf in a destarched plant was set up by a learner to perform an experiment on photosynthesis. Study the diagram and answer the questions below.



1.4.1 What was the aim of this experiment? (2)

1.4.2 What was the dependent variable in this experiment? (1)

1.4.3 What chemical was used to test for the presence of starch in the leaf? (1)

1.4.4 What was the colour change observed in areas of the leaf that were:

(a) Not exposed to sunlight (1)

(b) Exposed to sunlight (1)

1.4.5 State the:

(a) Human enzyme responsible for the digestion of the stored product of photosynthesis (1)

(b) Glands that secrete the enzyme mentioned in QUESTION 1.4.5(a) into the mouth cavity (1)

1.4.6 There are two gases involved in the process of photosynthesis.

(a) Which gas would not be produced, if the plant is placed in a dark box? (1)

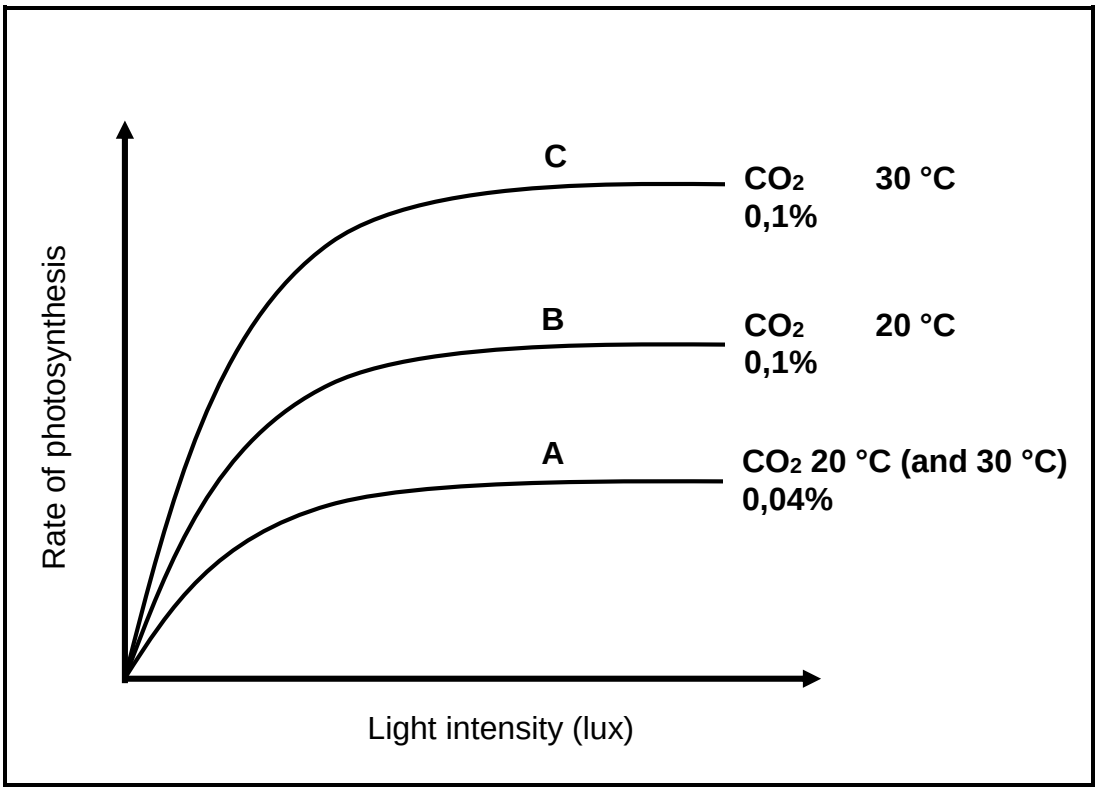
(b) Which of the gases mentioned above is required by living organisms to generate energy for body processes? (1)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The graph below shows the rate of photosynthesis under different environmental conditions. Study the graphs and answer the questions that follow.



2.1.1 Which of the graphs shows the highest production of glucose? (1)

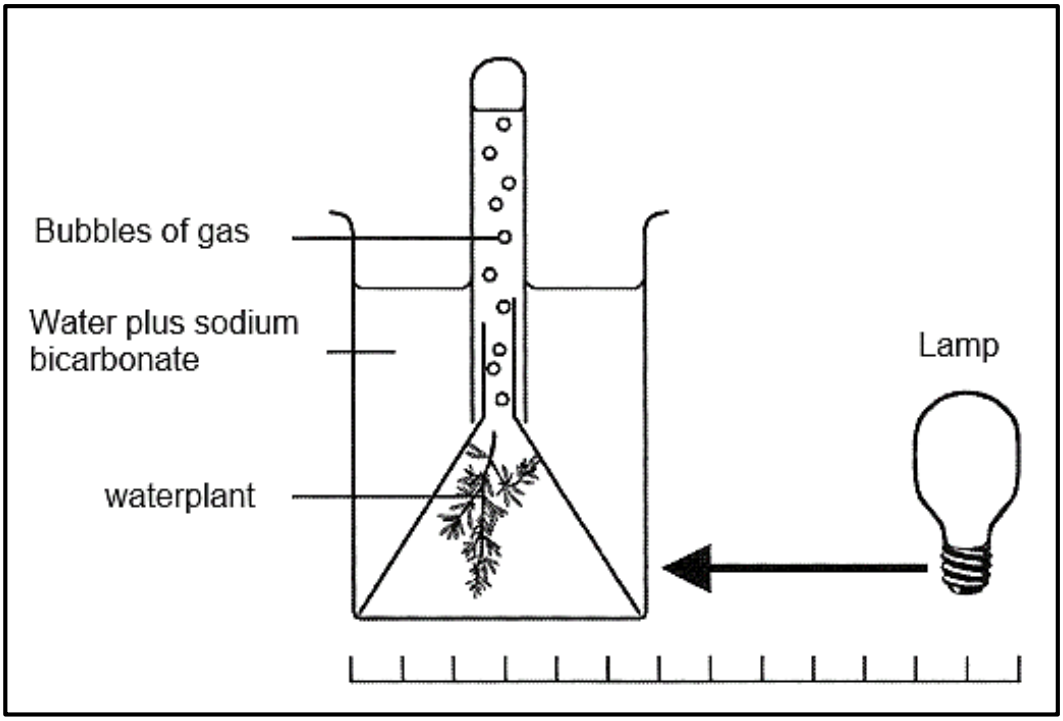
2.1.2 Why is the production of glucose in graph **A**, low? (1)

2.1.3 What factor in graph **B** and **C** limits the rate of photosynthesis? (1)

2.1.4 Predict what the graphs would look like if the temperature were increased first to 40 °C and then to 60 °C. (2)

2.1.5 Give a reason for your answer in QUESTION 2.1.4. (1)

2.2 An experiment was conducted to investigate the effect of light intensity and the rate of photosynthesis. The apparatus was set up as shown in the diagram below. Study the diagram and answer the questions.



2.2.1 State a reason:

(a) for choosing a water plant instead of a terrestrial plant in this particular experiment. (1)

(b) for the addition of sodium bicarbonate (baking powder) to the water. (1)

2.2.2 How was the rate of photosynthesis measured using this experiment? (1)

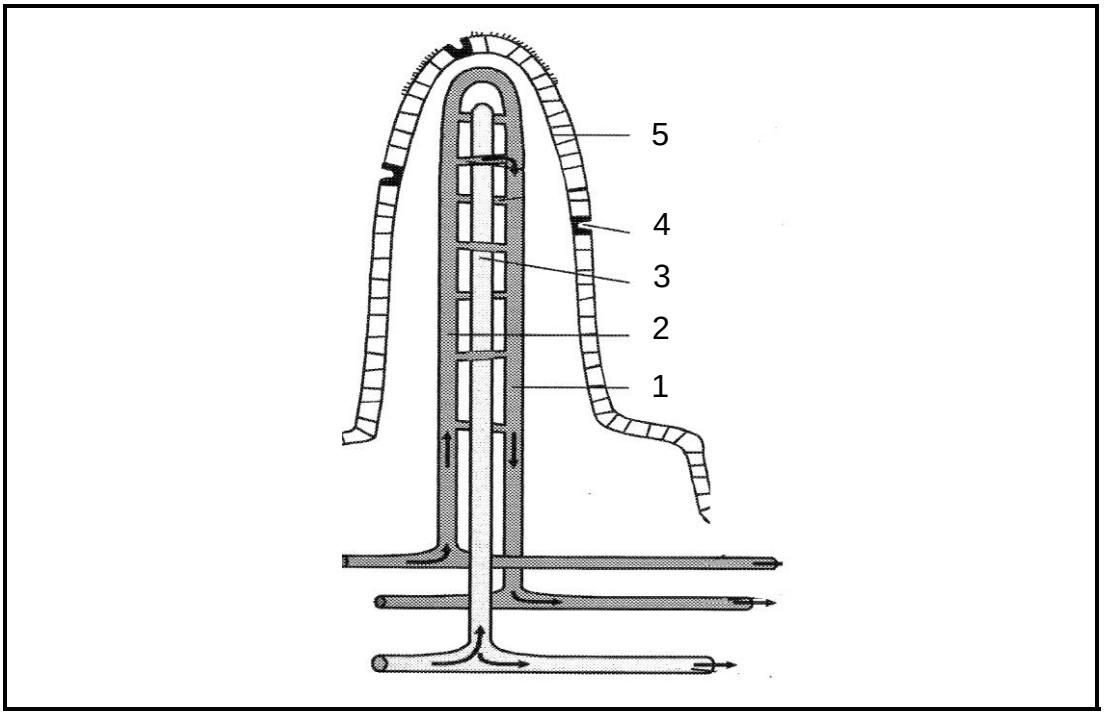
2.2.3 The data in the table below was recorded during the experiment:

A	B	C
Distance between the water plant and light source (metres)	**100 W bulb** Light intensity = power/Area Light intensity = W/m^2	Number of bubbles given off in one minute.
1,0	7,96	8
0,5	31,85	28
0,25	127,39	105
0,125	510,20	105

With reference to the results given above, what deduction can be made with regard to the relationship between the intensity of light and rate of photosynthesis? (3)

2.2.4 Explain why there is no change in the number of bubbles released when the light source is 0,25 m and 0,125 m from the water plant. (4)

2.3 The diagram below illustrates the microscopic structure of a villus. Study the diagram and answer the following questions.



2.3.1 Identify the part labelled **3** and its function. (2)

2.3.2 Which labelled part contains blood with relatively higher amounts of glucose and amino acids? (1)

2.3.3 Name the process that enables humans to absorb the nutrients mentioned in QUESTION 2.3.2. (1)

2.3.4 Explain how the villus is structurally adapted to enhance the absorption of digested nutrients from the small intestine. (3 x 2) (6)

2.4 Read the extract below and answer the questions that follow.

TOO MUCH CARBOHYDRATES AND TOO LITTLE PROTEINS

The World Health Organisation (WHO) defines malnutrition as "the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions." The term protein-energy malnutrition (PEM) applies to a group of related disorders. This involves inadequate intake of protein and calories and is characterised by emaciation (extreme thinness). The term was first used in 1933, and it refers to an inadequate protein intake with reasonable caloric (energy) intake.

[Adapted from http://emedicine.medscape.com]

2.4.1 State the World Health Organisation's definition of malnutrition. (2)

2.4.2 What condition can children suffer from if they get enough energy foods like bread, rice and porridge but not enough proteins? (1)

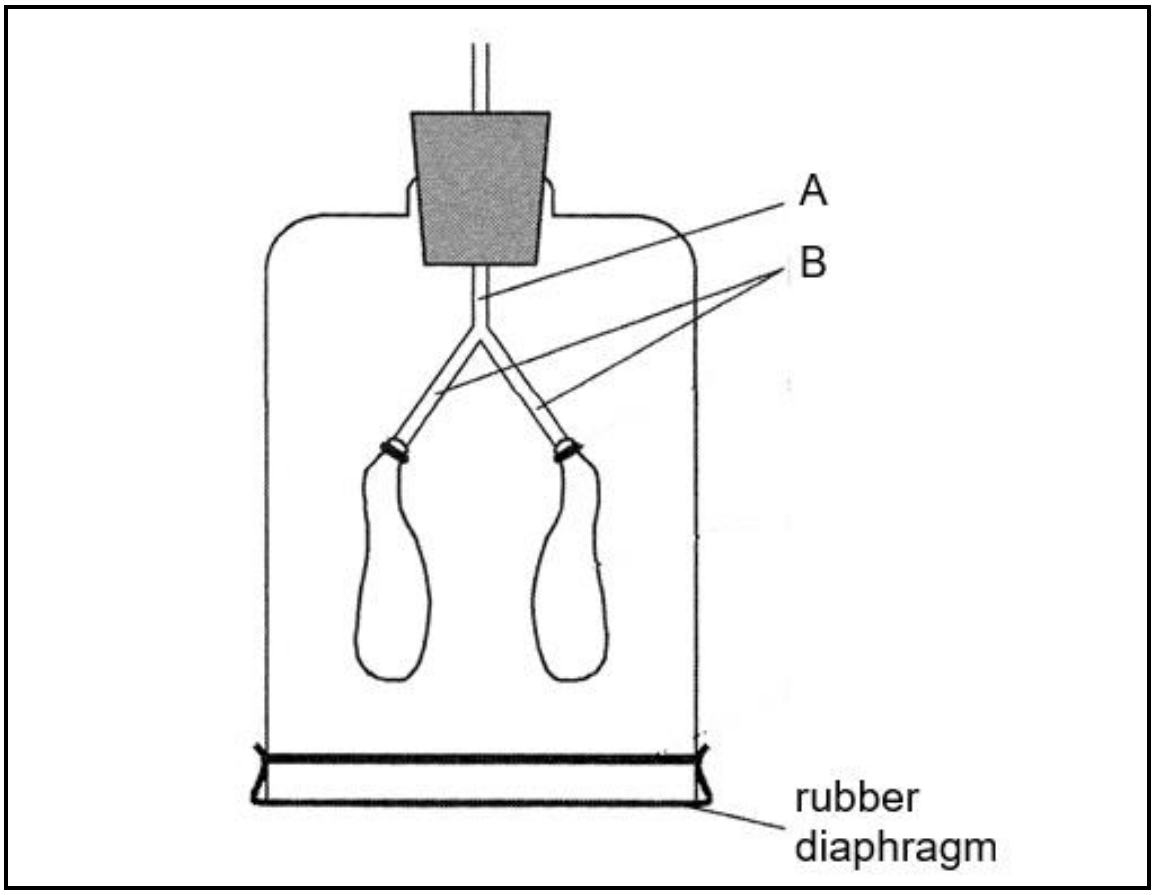
2.4.3 Describe the chemical digestion of proteins in the stomach. (5)

2.5 Explain how the human lungs are structurally suitable to function as an efficient organ of gaseous exchange. (6)

[40]

QUESTION 3

3.1 The following apparatus was set up in a laboratory. Study the sketch and then answer the questions.

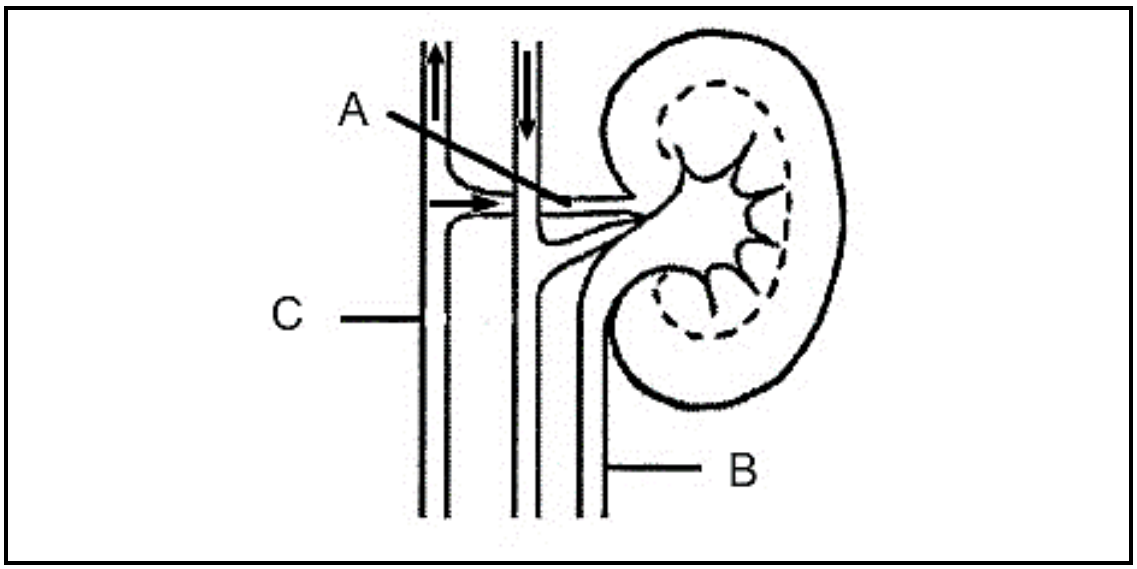


3.1.1 What parts of the human air passage way do the labels **A** and **B** represent? (2)

3.1.2 Explain what will happen to the balloons as the rubber diaphragm is pulled downwards. (3)

3.1.3 How does the working of the model shown in the above diagram differ from the breathing system of the human body? (2)

3.2 The accompanying diagram shows part of the excretory system of the human body. Study the diagram and the table below before answering the questions that follow.



3.2.1 Identify the labels marked **A**, **B** and **C**. (3)

The table below is shows the composition of fluid in **Structure A** and **Structure B** of the diagram.

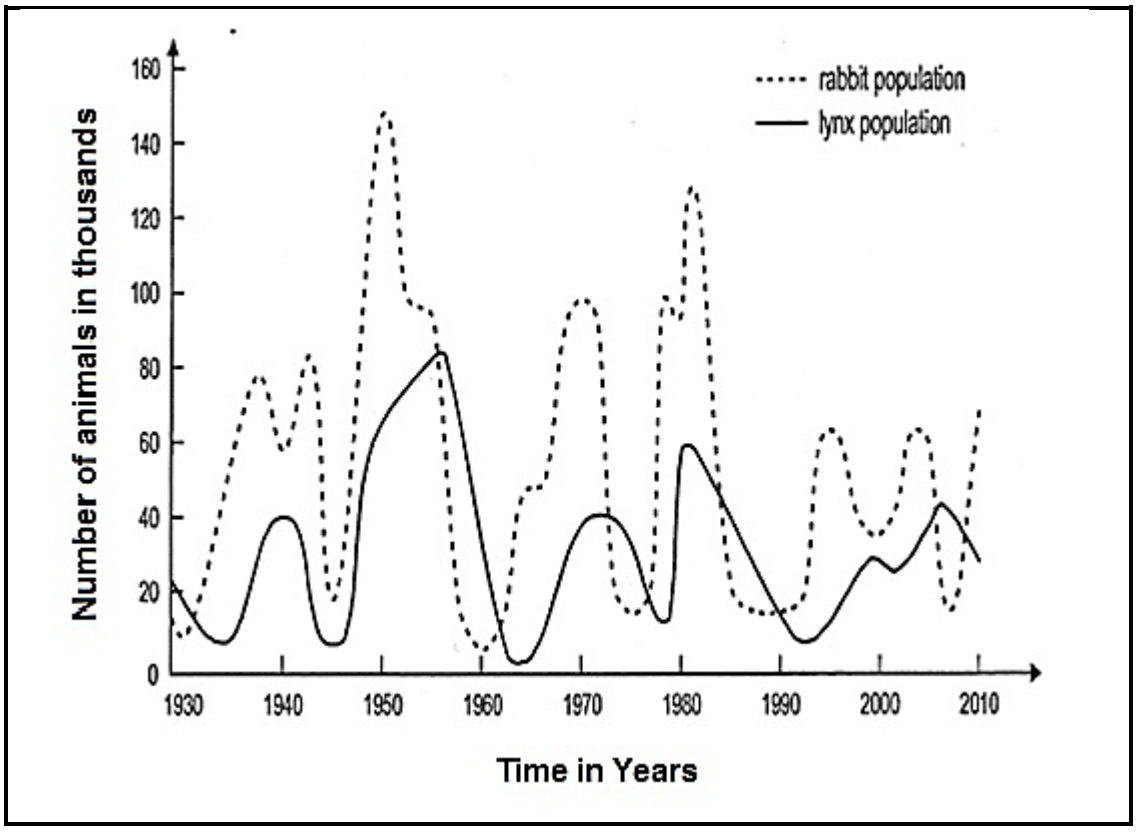
	Structure A	Structure B
Component	**Concentration (%)**	**Concentration (%)**
urea	3	200
glucose	10	0
amino acids	5	0
salts	72	150
proteins	800	0

3.2.2 By comparing the contents of structure **A** and **B**, what conclusion can be drawn regarding the functions of the kidney? (1)

3.2.3 Would you consider that the person with the medical report shown above suffers from diabetes mellitus? Explain your answer. (4)

3.2.4 Which organic substances in the table are considered to be useful? Give a reason for your answer. (4)

3.3 The graph below shows the interactions between two populations of animals over 80 years. Study the graph and answer the questions that follow.



3.3.1 Name THREE requirements that a group of organisms must satisfy before it can be called a population. (3)

3.3.2 What type of interaction between the rabbit and the lynx is illustrated by the graph above? (1)

3.3.3 What was the population size of the lynx in 1950? (1)

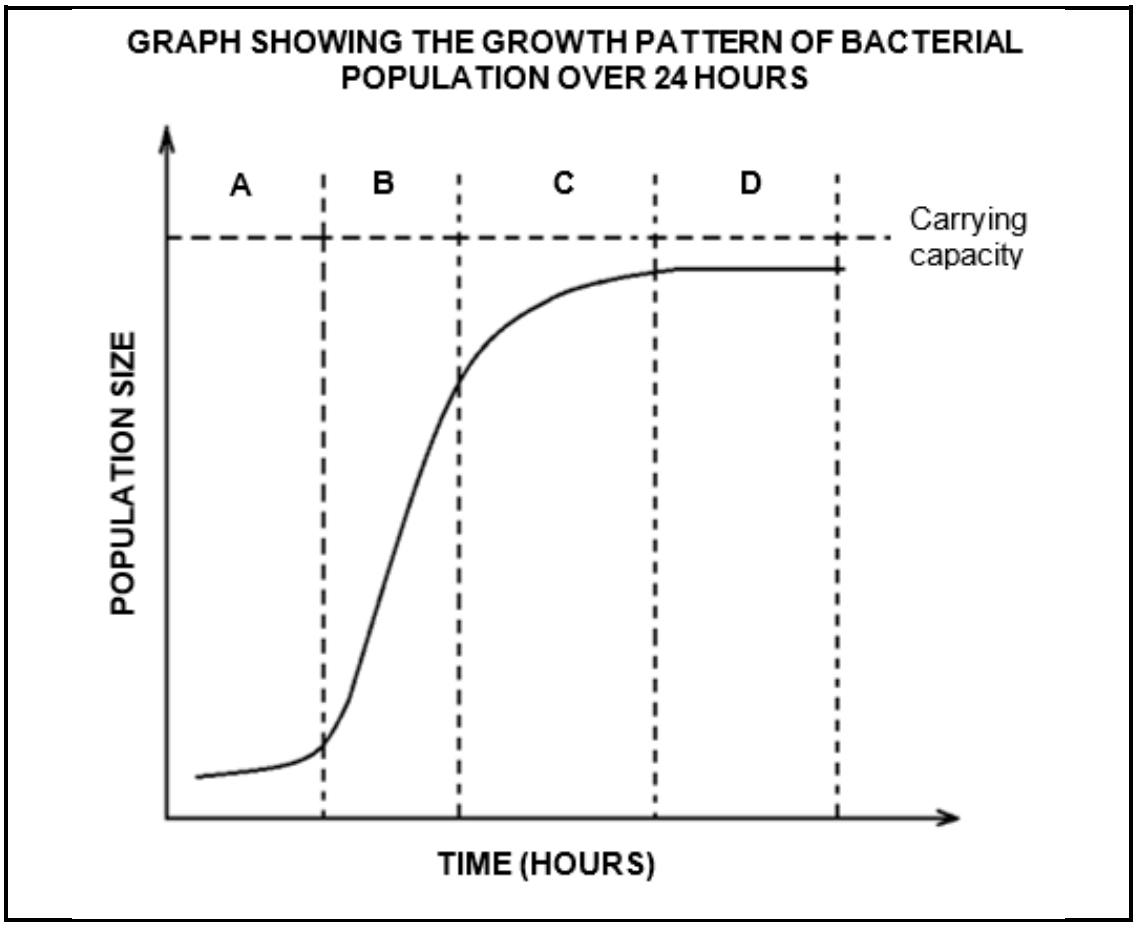
3.3.4 What happened to the lynx population as the number of rabbits increased from 1945 to 1950? Explain your answer. (2)

3.4 Define the following biological concepts:

(a) Mutualism (2)

(b) Commensalism (2)

3.5 The graph represents the number of bacteria in a growth culture over a period of 24 hours. Study the graph and answer the following questions.



3.5.1 Identify the phase:

(a) **A** (1)

(b) **B** (1)

(c) **D** (1)

3.5.2 During which phase (**A**, **B**, **C** or **D**) did natality exceed mortality to the greatest extent? (1)

3.5.3 Explain why growth rate slows down at **C**. (2)

3.5.4 The size of the human population has reached close to the carrying capacity. Explain the chances of survival of mankind if the present birth-rate continues. (2)

3.6 Mention any TWO stages that takes place during ecological succession. (2)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Describe the different stages of aerobic respiration and explain how high levels of CO_2 produced during strenuous exercise are reduced to normal in the human body.

Content: (17)
Synthesis: (3)

NOTE: No marks will be awarded for answers in the form of a charts or diagrams.

TOTAL SECTION C: 20
GRAND TOTAL: 150