General Certificate of Education (Adv. Level) Examination, April 2006
Biology II

Three hours

Important

- *This question paper comprises* ***Part A*** *and* ***Part B****. The time allotted for* ***both parts is three hours.***

PART A - Structured Essay:
Answer all questions on this paper itself. Write your answers in the space provided for each question. Please note that the space provided is sufficient for your answer and extensive answers are not expected.

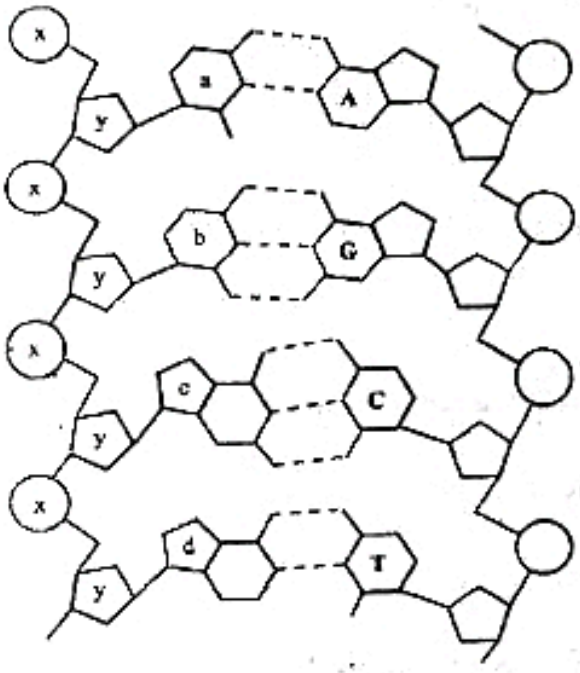
PART B - Essay:
Answer four questions only. Use the papers supplied for this purpose. At the end of the time allotted for this paper, tie the two parts together so that Part A is on the top of Part B before handing over to the supervisor.

You are permitted to remove only Part B of the question paper from the Examination Hall.

Part A - Structured Essay

Answer all questions on this paper itself
(Each question carries 10 marks)

1. (A)



The above diagram is a representation of a part of a DNA molecule.

(i) Name the components labelled a, b, c, d, x and y.

a. ..... b. .....

c. ..... d. .....

x. ..... y. .....

(ii) Write three features of DNA, which are necessary for its function as hereditary material of organisms.

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(iii) Name two laboratory techniques which are used to isolate DNA molecules from cell extracts.

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(iv) What happens to DNA when it is heated to 90°C?

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(B) (i) Name two sites outside the nucleus of an eukaryotic cell where RNA is found.

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(ii) Name the site in the eukaryotic cell where RNA is synthesised.

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(iii) State three structural differences between DNA and RNA.

DNA	RNA
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.....	.....
.....	.....

(iv) State three functions of RNA.

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(C) (i) Name the three essential components of a nucleotide.

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(ii) Name three nucleotides other than those found in DNA and RNA and state one function of each of them.

Nucleotide	Function
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.....	.....
.....	.....

(iii) Name the two major substances that are structural components of an eukaryotic chromosome.

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(iv) How many chromosomes are found in the nucleus of a human sperm?

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(D) (i) What is a codon?

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(ii) What is the structural relationship between genes and proteins?

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(iii) What are genetically modified organisms (GMO)?

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(iv) State three different applications of genetically modified organisms (GMO).

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2. (A) (i) What is a species?

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(ii) What is the group of animals that shows the highest species diversity?

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(iii) What is a taxon?

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(iv) Name the main taxa in the order of increasing number of organisms.

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(B) (i) What is extinction of species?

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(ii) State two major significances of natural extinction of species.

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(iii) Name three groups of animals which were subjected to mass extinctions and state the period in which each of these extinctions took place.

Group of animals	Period of extinction
.....	.....
.....	.....
.....	.....

(iv) What is considered as the reason for the last mass extinction?

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(C) (i) Name the major biomes of the world.

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(ii) What is the northern-most biome of the world?

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(iii) Name four of the major terrestrial ecosystems seen in Sri Lanka?

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(iv) What are the major inland wetland ecosystems seen in Sri Lanka?

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(D) (i) What is the most practical way of conserving biodiversity of a particular country?

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(ii) What is meant by *ex-situ* and *in-situ* conservation?

Ex-situ conservation .....

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In-situ conservation .....

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(iii) State **two** major methods of *ex-situ* conservation.

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(iv) State **two** major methods of *in-situ* conservation.

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3. (A) (i) What is meant by excretion?

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(ii) How does defaecation differ from excretion?

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(iii) State the **two** main excretory products of man.

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(iv) Name the main animal groups that excrete nitrogenous waste as solids.

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(v) What are the excretory organs of a leech?

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(vi) State **two** main factors which determine the nature of excretory products of an animal.

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(B) (i) State the location of the human kidneys.

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(ii) State three functions of the human kidney other than urine production.

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(iii) A high renal blood pressure is required for ultrafiltration. How is this high blood pressure brought about in the human kidney?

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(iv) Where does ADH act on the human nephron?

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(v) What is the stimulus for the release of ADH from the anterior pituitary?

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(C) (i) What is meant by obligatory resorption of water in the human nephron?

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(ii) Where does the obligatory resorption of water take place in the human nephron?

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(iii) Name three ions secreted by the human nephron.

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(iv) State one main function of the juxta-glomerular complex of the human kidney.

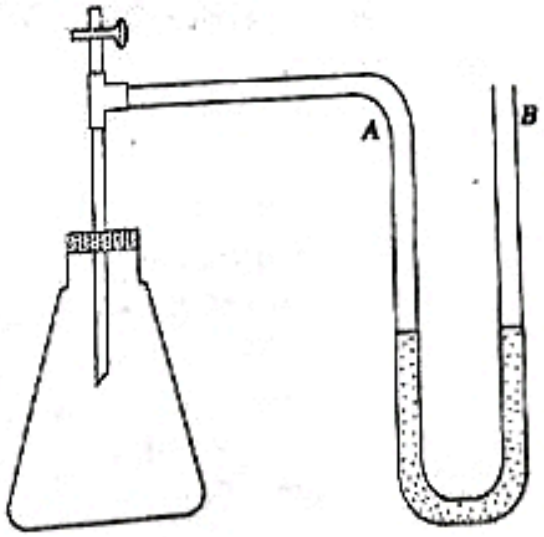
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(v) Why is it necessary to drink water frequently to reduce the risk of developing stones in the kidney?

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(D) The diagram below shows a simple respirometer that can be used to determine the rate of respiration in germinating seeds.



(i) Explain how this apparatus can be used to determine the rate of oxygen uptake of the germinating seeds.

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(ii) Explain how this apparatus can be used to determine the rate of carbon dioxide release from the same sample of germinating seeds.

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(iii) Explain how respiratory quotient of the germinating seeds could be calculated using the measurements made in (i) and (ii).

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(iv) If the seeds used in the above experiment were germinating green gram seeds what will be the expected respiratory quotient? Explain the answer.

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(v) If the seeds used in the above experiment were germinating castor seeds what will be the expected respiratory quotient? Explain the answer.

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4. (A) (i) With reference to microbial diseases briefly explain the following terms.

(a) Pathogenicity .....

(b) Invasiveness .....

(c) Toxigenicity .....

(ii) Name two extracellular enzymes that contribute to invasiveness and state one function of each of these enzymes.

Enzyme	Function
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.....	.....
.....	.....

(iii) What are antibiotics?

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(iv) Name two commonly used antibiotics and state the mode of action of each of them.

Name of antibiotic	Mode of action
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.....	.....

(B) (i) What are the major factors that should be considered in selecting a suitable method for pest control?

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(ii) Name three major methods of insect pest control used in Sri Lanka and gives one example For each of them.

Method	Example
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.....	.....
.....	.....

(iii) What is meant by integrated pest management?

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(C) (i) Five types of food fish in Sri Lanka are trenched sardine, tilapia, common carp, shark and grey mullet. Fill in the blanks of the following dichotomous key prepared to identify these species.

1. Terminal mouth present _____ ②
   Ventral mouth present .....
2. One dorsal fin _____ ③
   Two dorsal fins .....

3. Fins without spines ——————————— ④

   Fins with spines .....

4. Barbels present .....

   Barbels absent .....

(ii) **Five** fish species used for aquaculture in Sri Lanka are *Catla catla, Labeo rohita, Cirrhinus mrigala, Oreochromis niloticus* and *Oreochromis mossambicus*. The natural food items of the adults of these fish species are given in column **A** of the following table. Write the correct fish species corresponding to these food items in column **B**.

Column A	**Column B**
Natural food items of adult	**Fish species**
• detritus, zooplankton, small animals	.....
• detritus, aquatic macrophytes	.....
• detritus, aquatic macrophytes, small animals	.....
• small animals, plankton	.....

(iii) Name the **two** viruses that caused heavy damage to the shrimp farming industry in Sri Lanka in the recent past.

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(iv) What are the **three** major steps in producing postlarvae in shrimp hatcheries?

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(D) (i) What is meant by tissue culture?

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(ii) Name **two** substances other than mineral salts and water which are generally incorporated into tissue culture media.

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(iii) Name **four** advantages of using tissue culture techniques over traditional techniques for propagating plants.

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(iv) Name **four** methods of vegetative plant propagation other than tissue culture, and give an example of a crop plant that is usually propagated using each of these methods.

Method	**Crop plant**
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.....	.....
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Part B - Essay

Answer four questions only
Give clearly labelled diagrams where necessary
(Each question carries 15 marks)

1. (a) Describe briefly the ultrastructure of a chloroplast.
   (b) Explain how light energy is transformed into chemical energy in the chloroplast during light reactions of photosynthesis.

2. (a) State the stages seen in a typical industrial waste water treatment plant and describe briefly the changes that take place in each of these stages.
   (b) What are the harmful effects of discharging untreated waste water into a natural water system?

3. Describe the basic structural and functional features of an estuarine ecosystem.

4. (a) Briefly describe the external morphology and life cycle of *Ascaris lumbricoides*
   (b) Explain how the infection of *Ascaris lumbricoides* could be controlled.

5. Explain how the body temperature is regulated in man

6. Write short notes on the following
   (i) Hypothalamus
   (ii) Green house effect
   (iii) C_4 plants