Bishop's Conservatory Secondary School

Form 5 Annual 2009

Biology Paper II B

Name: _____

Subject:	Biology
Paper Number:	II B
Date:	Wednesday 25th March
Time:	2nd session

Answer any four (4) questions. Each question carries 25 marks

Please note that <u>if you choose</u> question 2 you shall need a *graph paper*.

1. Fish are **ectothermic** vertebrates.

a) ***Explain*** the term *ectothermic* and name **TWO** other animal vertebrate classes that are also ectothermic. (2, 2 marks)

b) i. <u>Draw</u> a labeled diagram to show the external features of a bony fish. (5 marks)

ii. Name **TWO** structural features of fish that make them well adapted for life in water and ***indicate*** why each feature is important. (4 marks)

c) With the aid of a diagram and a clear explanation, ***describe*** the way in which bony fish exchange gases with the environment. (5 marks)

d) List **THREE** characteristics that make the respiratory surfaces in fish efficient. (3 marks)

e) Fish farming is an industry of great economic importance, yet many citizens especially those living in coastal areas, object to fish farms. Give **TWO** negative effects of fish farming on the environment. (2 marks)

f) A *Common Fisheries Policy* is used to protect fish stocks in European waters. This policy prohibits the catching of fish smaller than a certain size. ***Explain*** the importance of this policy for the fishing industry. (2 marks)

(Total 25 marks)

2. The following table shows the number of threatened species of birds from the year 2000 to 2007, expressed as a percentage of the number of described species.

Year	Number of threatened species	Number of threatened species as a % of described species.
2000	1183	11.88
2002	1192	11.97
2003	1194	11.99
2004	1213	12.18
2006	1206	12.11
2007	1217	12.22

(*Source: Red List of the IUCN 2007*)

a) Draw a *line graph* representing the number of threatened bird species as a percentage of described species against the year. (Plot year on the x-axis. Start y-axis from 11%) (6 marks)

b) Describe and comment about the general pattern shown in the graph. (3 marks)

c) List **TWO** structural characteristics of birds and explain the importance of ***one*** of the characteristics you have mentioned. (2,1 marks)

d) i. A group of biologists carried out a study about the number of threatened gymnosperms. The results of the study showed that the number of threatened gymnosperm species in 2007 amounted to 321 out of 980 species. Work out the percentage of threatened gymnosperm species in 2007. (2 marks)

ii. Suggest TWO things that cause the gymnosperm trees to become threatened. (2 marks)

iii. Name a species of gymnosperm found in the Maltese island (you can give the English name). (1 mark)

e) The biologists also studied the number of mosses, ferns, dicotyledons and monocotyledons that were threatened species in 2007. List one characteristic feature of:

i. Mosses (2 marks)
ii. Ferns (2 marks)

f) The iris is a monocotyledon whilst hibiscus is a dicotyledon. List **one** structural difference observed:

i. In the ***flowers*** of the two plants (2 marks)
ii. In the ***seeds*** of the two plants (2 marks)

(Total 25 marks)

3. a) Give a **biological explanation** for each of these.

i. A farmer who has been working outside all day on a hot summer's day produces a much smaller amount of urine than normal. It is also much darker yellow in colour than normal. Explain these points. (2 marks)

ii. The lungs are excretory organs. (2 marks)

iii. People who live at high altitudes, where there is less oxygen, have more red blood cells per litre of blood than people who live at lower altitudes. (2 marks)

iv. In the heart, the ventricles have thicker walls than the atria. (2 marks)

v. Arterial walls have more muscle and elastic tissues than veins. (2 marks)

vi. The small diameter of capillaries allows the passage of just one red blood cell passing through at a time. (3 marks)

vii. Sheep have cellulose digesting bacteria in their gut but lions do not. (2 marks)

viii. The heart rate increases when a person is frightened. (2 marks)

ix. Progesterone is produced throughout the pregnancy period. (2 marks)

b. **Distinguish** between these terms:

i. Genotype and phenotype (2 marks)

ii. Egestion and excretion (2 marks)

iii. Breathing and respiration (2 marks)

(Total 25 marks)

4. This question is about processes occurring in plants.

a) List ***three conditions*** needed for germination. (3 marks)

b) Explain the meaning of the word 'tropism'. (2 marks)

i. Explain the difference between 'positive geotropism' and 'negative geotropism'. (Support your explanation with examples). (4 marks)

ii. "Plants' shoots always grow towards the light". Describe an experiment, including a control, to show that the statement is correct. (6 marks)

iii. What is the advantage of this response to the plant? (2 marks)

c) State the main ***function*** of green leaves. (1 mark)

i. List the raw materials that leaves need to perform this function (3 marks)

ii. Draw a palisade mesophyll cell and clearly label its main components (3 marks)

iii. Explain why green plants are often called producers. (1 mark) ***(Total 25 marks)***

5. a) Draw a labelled diagram to show the human urinary system (5 marks)

b) Name the functional unit present in the kidneys and explain one process that takes place in it. (1, 2 marks)

c) List TWO ways by which patients with complete kidney failure can be helped, and for **each** way you mention give **ONE** possible disadvantage. (2, 2 marks)

d) Name the main food type that a person with kidney failure has to avoid and give a reason for your answer (2 marks)

e) Give a difference you expect to find between the excretory system of a desert rat and a rat living in Malta and give a reason for this difference. (2 marks)

f) Thomas is a carrier for an ***autosomal recessive*** kidney disease. He married Ingrid who also happened to be a carrier, and they gave birth to three children.

i. Explain what is meant by the terms ***autosomal recessive***. (2 marks)

ii. Give the genotypes of Thomas and Ingrid. (2 marks)

iii. Draw a genetic diagram to show the possibility of Thomas and Ingrid giving birth to a child who has this kidney disease and clearly state the percentage chance of this happening. (3 marks)

iv. In reality, all the three children of the couple were born normal and showed no traits of the disease. Explain how this happened. (2 marks)

(Total 25 marks)

6. a) Describe in detail an experiment you would carry out to demonstrate osmosis if you are provided with a number of potato strips taken from the same potato and commonly found laboratory equipment and solutions. In your answer include:

i. The aim of the investigation; (1 mark)
ii. The procedure followed; (4 marks)
iii. The readings that should be taken; (2 marks)
iv. The conclusion of your experiment. (1 mark)

b) A student looking at plant cells under the light microscope identified some cells that were plasmolysed.

i. Draw a labeled **diagram** of a plasmolysed plant cell. (4 marks)

ii. How can a plant become plasmolysed? What happens during the process? (4 marks)

iii. Plasmolysis is a characteristic of plant cells and never of animal cells. Why? (3 marks)

c) All living organisms have a high content of water in their body. The water molecule has many functions in living organisms.

i. Explain how water acts as a transport medium in **animals**. (3 marks)

ii. Give **THREE functions** of water in plants. (3 marks)

(Total 25 marks)

7. a) i. What are gametes? (1 marks)

ii. Where are gametes formed in humans and what are they called? (4 marks)

iii. What type of cell division occurs only during gamete formation and what is the effect of this cell division on the chromosome number of the nuclei? (2 marks)

b) Copulation in humans may result in fertilisation. When fertilisation occurs, it may result in the formation of a single zygote, identical twins or fraternal twins.

i. Distinguish between 'copulation' and 'fertilisation'. (2 marks)

ii. Explain clearly what happens when fertilisation results in the formation of:

- A single zygote (2 marks)
- Identical twins (3 marks)
- Fraternal twins (2 marks)

c) Explain to a pregnant woman why:

- Smoking
- Alcohol taken in excess
- Lack of calcium in her diet;

are dangerous during pregnancy. (2 marks each)

d) Name and briefly explain a birth control method that prevents ***fertilisation*** from occurring. (3 marks)

(Total 25 marks)

8. The table below shows the average composition of milk:

Nutrient	**% Composition**
Fat	3.6
Protein	3.6
Sugar	4.5
Mineral Salts	0.7
Vitamins	0.2
Water	87.4

a) Which of the nutrients present in milk consist only of carbon, hydrogen and oxygen? (2 marks)

b) One function of proteins is to regulate metabolic processes. These proteins are called enzymes.

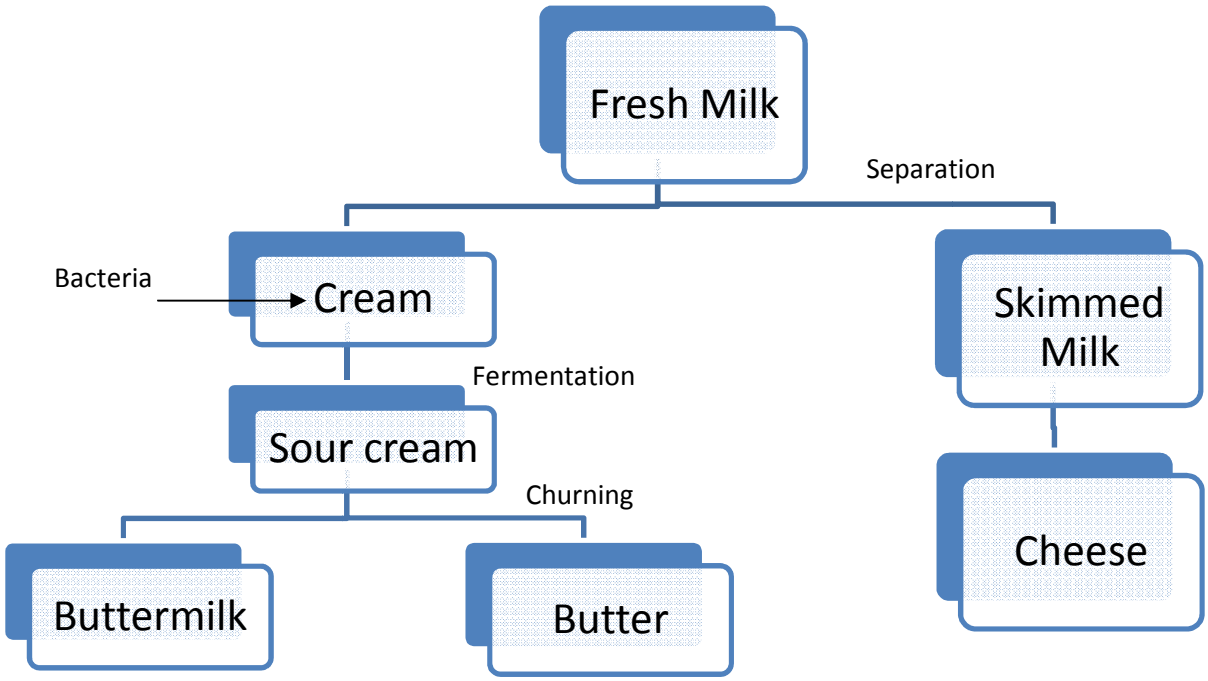
i. Explain by means of a diagram, the ***lock and key mechanism*** which shows how enzymes work. (3 marks)

ii. Enzymes are proteins. Apart from being proteins, give **TWO** other properties of enzymes. (4 marks)

c) Describe how a student could ***test*** milk for the presence of proteins. (2 marks)

This question is continued on the next page...

d) Milk is used in the production of butter and cheese. Below is a simplified flow diagram which describes the production of butter:



i. Why is bacteria added to the cream? (2 marks)

ii. Write a word equation to show the fermentation process in which cream is converted to sour cream. (3 marks)

iii. Bread making is also the result of fermentation. Give the products of this fermentation process. (2 marks)

e) Cream has a higher fat content than milk.

i. Draw a **simple diagram** to represent the shape of a fat molecule. (3 marks)

ii. Give **two** functions of fat in animals. (2 marks)

iii. A high amount of fat in the diet leads to obesity. Give **ONE** effect of obesity on the health of a person. (2 marks)

(Total 25 marks)