Biology II

021

03 Nov. 2010 2.00 – 5.00 pm

RWANDA NATIONAL EXAMINATIONS COUNCIL

P.O. BOX 3817 KIGALI -TEL/FAX 586871

ADVANCED LEVEL NATIONAL EXAMINATIONS 2010

SUBJECT : BIOLOGY

PAPER II : THEORY

COMBINATION :PHYSICS – CHEMISTRY- BIOLOGY : PCB
:MATHS-CHEMISTRY-BIOLOGY: MCB
: BIOLOGY –CHEMISTRY- GEOGRAPHY: BCG

DURATION : 3 HOURS

INSTRUCTIONS

This paper consists of **two** Sections A and B

- Attempt **all** questions in section A: **(70 marks)**
- Answer any **three** questions in section B: **(30 marks)**

SECTION A: Answer all questions in this section (70 MARKS)

1. (a) Name the bond that links amino acids together in a polypeptide chain. **(1mark)**
   (b) Why is an amino Acid described as being amphoteric **(2 marks)**

2. The two –sport lady bird, adalis bipunctata is a common beetle. Complete the table classifying adalia bupunctata. **(3 marks)**

Kingdom	.....
Phylum	Arthropoda
.....	Insecta
.....	Coleoptera
.....	Coccinellidae
Genus	.....
Species	.....

3. An amoeba does not have a cellulose wall. If an amoeba is placed in a solution which is less concentrated than its cytoplasm,what do you think will happen? Explain your answer. **(3 marks)**

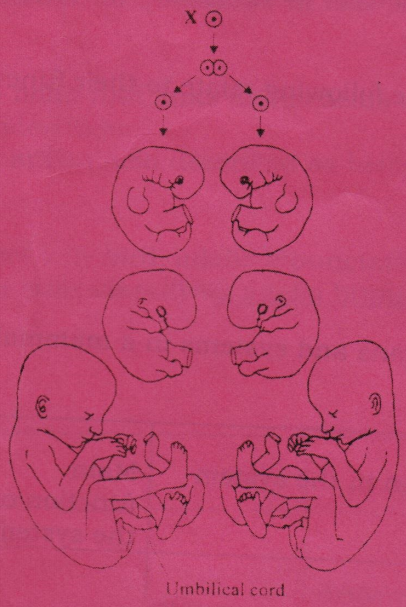
4. Explain how the structure of the following relate to their function in photosythesis.
(a) Palisade mesophyll cells
(b) The xylem.
(c) Airspace in spongy mesophyll
(d) guard cells **(4 marks)**

5.Complete the table below of organs and systems in a mammal. **(7 marks)**

System	Main organ in the system	Main function of the system
Circulatory system	- ---------- --	_____
Lymphatic system	Lymph Vessels,Lymph nodes	(i)_____ _____ ___
Excretaory system	_____ _____	(ii)_____ _____ —
Reproductive system	_____ _____ _____	---------- ---------- ---------- Produces offsprings

6. Mendel crossed peas with round, green seeds to ones with wrinkled, yellow seeds.
All F1 plants had seeds that were round and yellow. Predict the results of test-crossing these F1 Plants **(4 marks)**

7. The diagram below shows one way in which twins can be formed.



(a) (i) Give the name of the cell labelled X **(1 mark)**

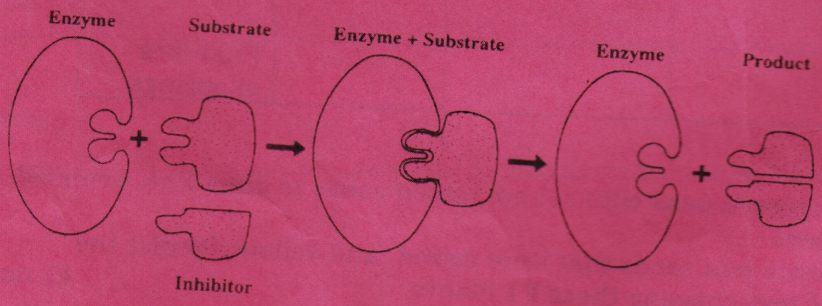
(ii) Why, in this case will the individuals who develop from the embryos be identical twins? **(2 marks)**

(b) The umblical cord contains two arteries and one vein.Give one function of:

(i) The umblical arteries **(1 mark)**

(ii) The umblical vein **(1 mark)**

8. The diagram below illustrates the induced fit model of enzyme action



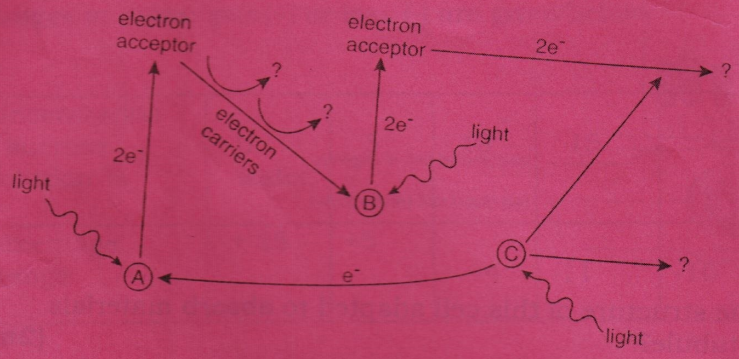
(a) Use the diagram to explain:

(i) The induced fit model **(2 marks)**

(ii) Competitive inhibition **(2 marks)**

b)How would the diagram be different if it were used to ullustrate the lock and key hypothesis? **(1 mark)**

9. The figure below shows the sequence of events that take place in the light dependent reactions.



(a) Identify the points labelled A and B

A=
B= **(2 marks)**

(b) what process is taking place at C? **(1 mark)**

(c) What are the products of the light dependent reaction (They are indicated by question marks(?) On the diagrám) **(3 marks)**

10. Samples of Amoeba were mounted on six slides with different concentrations of sodium chrolide solution.The average number of times that a contractule vacuole formed and emptied in 10 minutes was recorded.

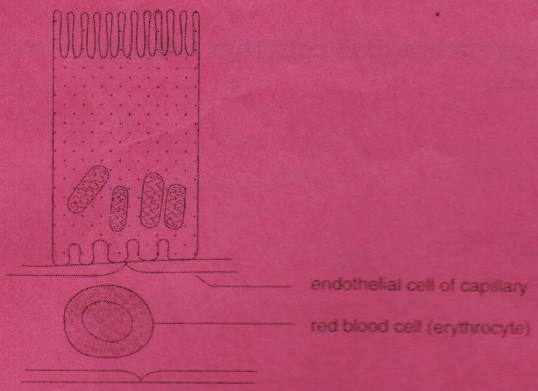
% sodium chloride	0.5	1.0	1.5	2.0	2.5	3.0
Number of Vacuoles	9	7	5	4	3	2

(a) Plot a graph of these results ,with % sodium chloride solution on the horizontal axis **(2 marks)**

(b) Explain the difference between the results in 0.5 and 2.5 % sodium chloride. **(2 marks)**

(c) In 5% sodium chloride solution,vacuoles formation stopped. Did this mean the amoeba had died? Explain. **(2 marks)**

11. The diagram below shows the detailed structure of a cell of the proximal convoluted tubule and adjecent capillary.



(a) How is the structure of this cell adapted to absorb materials from the tubule? **(2marks)**

(b) Describe the way in which glucose and water are removed from the filtrate into the capillary. **(2 marks)**

12. In dogs dark coat colour (D) is dominant to albino (d) and short hair (H) is dominant to long hair(h).These two genes are not linked. A purebred dark short haired dog is crossed with a purebred albino long-haired dog.

(a) What is the genotype and phenotype of the Fi puppies **(2 marks)**

(b) Two of the Fi dogs are crossed and an F2 produced.Draw punnet square to show the parental gametes and genotypes and phenotypes of the offsprings.
What is the F2 ratio of phenotypes? **(6 marks)**

13. A piece of thread was tied tightly round an animal pancreatic duct. The animal subsequently had difficulty in digesting food but did not get diabetes. Explain. **(4marks)**

14. Explain why the tapeworm has the following special features as a result of its parasitic way of life.

(a) No digestive system
(b) No means of locomotion
(c) Reduced Nervous system **(3 marks)**

15. Some white blood cells make antibodies.These can help a person to overcome an infection,such as influenza.Vaccination is a process which stimulates the production of antibodies. Explain how vaccination can be used to make a person immune to the influenza. **(5 marks)**

SECTION B (30 MARKS)

Answer only three questions in this section

16.(a) How is osmosis different from diffusion ? **(2 marks)**

b) Potato strips were left in various liquids.The percentage changes in mass; gain(+) or loss (-) are given below.

Concentration of sucrose Solution %	0 water	5	10	15	20
Percentage change	+ 15	+5	-4	-11	-16

(i) In which liquid did the potato strips increase in mass? Explain why. **(2marks)**

(ii) In which liquids did the potato strips dicrease in mass. Explain why. **(2marks)**

(iii) If the potato strips had been smaller,what effects would this have had on the activity? Expalin why. **(2 marks)**

(iv) What changes would you expect if the potato strips had been boiled ? **(2 marks)**

17. Describe the events that characterise each stage of mitosis. **(10 marks)**

18. Phenylketonuria (PKU) is an inherited condition.It is an example of a discontinous variation and was originally caused by a mutation which produced a recessive allele of a certain gene.

(a) What is meant by each of the following biological terms?

(i) Discontinous variation

(ii) Mutation

(iii) Recessive

(iv) Gene **(4 marks)**

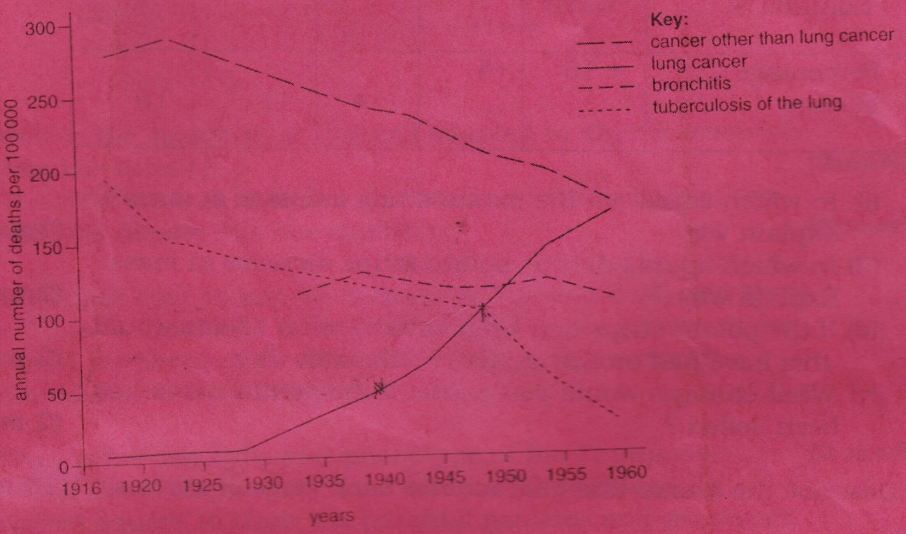
(b) A man and his wife are both heterozygous for PKU. They do not suffer from the diseases.

(i) This couple has so far had two children both girls.Neither of these has PKU.Draw a suitable genetic diagram to show how it is possible for a man and his wife to produce some children who suffer from PKU and some that do not.
Use the following symbols:
N= allele for not suffering from PKU
n=allele for PKU

(ii) The wife is pregnant again.what is the probability that her new child:-
(1) Will suffer from PKU
(2) Will be a boy **(2marks)**

19.(a) Describe the **THREE** ways by which smoking danages the lungs. **(3 marks)**

(b) The figure below shows annual number of death from lung cancer, other cancers, bronchitis and tuberculosis of the lungs in men from 1916 to 1960.



Compare the graphs for lung cancer and tuberculosis over this Period. **(3 marks)**

(c) What is the percentage increase in the annual number of deaths from lung cancer between 1940 and 1950? **(2 marks)**

(d) Suggest reasons for the pattern of changes shown in the graphs for lung cancer and tuberculosis. **(2 marks)**

20. Describe the role of the mammalian liver in:-
(a) Protein metabolism **(5 marks)**
(b) Carbohydrates metabolism **(5 marks)**