P530/2
BIOLOGY
(Theory)
Paper 2
Nov./Dec. 2020
2½ hours

UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

BIOLOGY
(THEORY)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of **six** *questions.*

Answer question **one** *in section* **A** *plus* **three** *others from section* **B**.

Candidates are advised to read the questions carefully, organise their answers and present them precisely and logically, illustrating with well labelled diagrams where necessary.

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SECTION A (40 MARKS)

Question **1** *is* **compulsory**.

1. In an experiment, cells obtained from the root of wheat seedlings were studied in a culture media of varying oxygen concentrations. The effect of oxygen concentrations on the uptake of potassium ions in the root cell sap, and the consumption of sugar by the root cell sap were investigated and the results presented as shown in figure **1.**
Study the figure and answer the questions that follow.

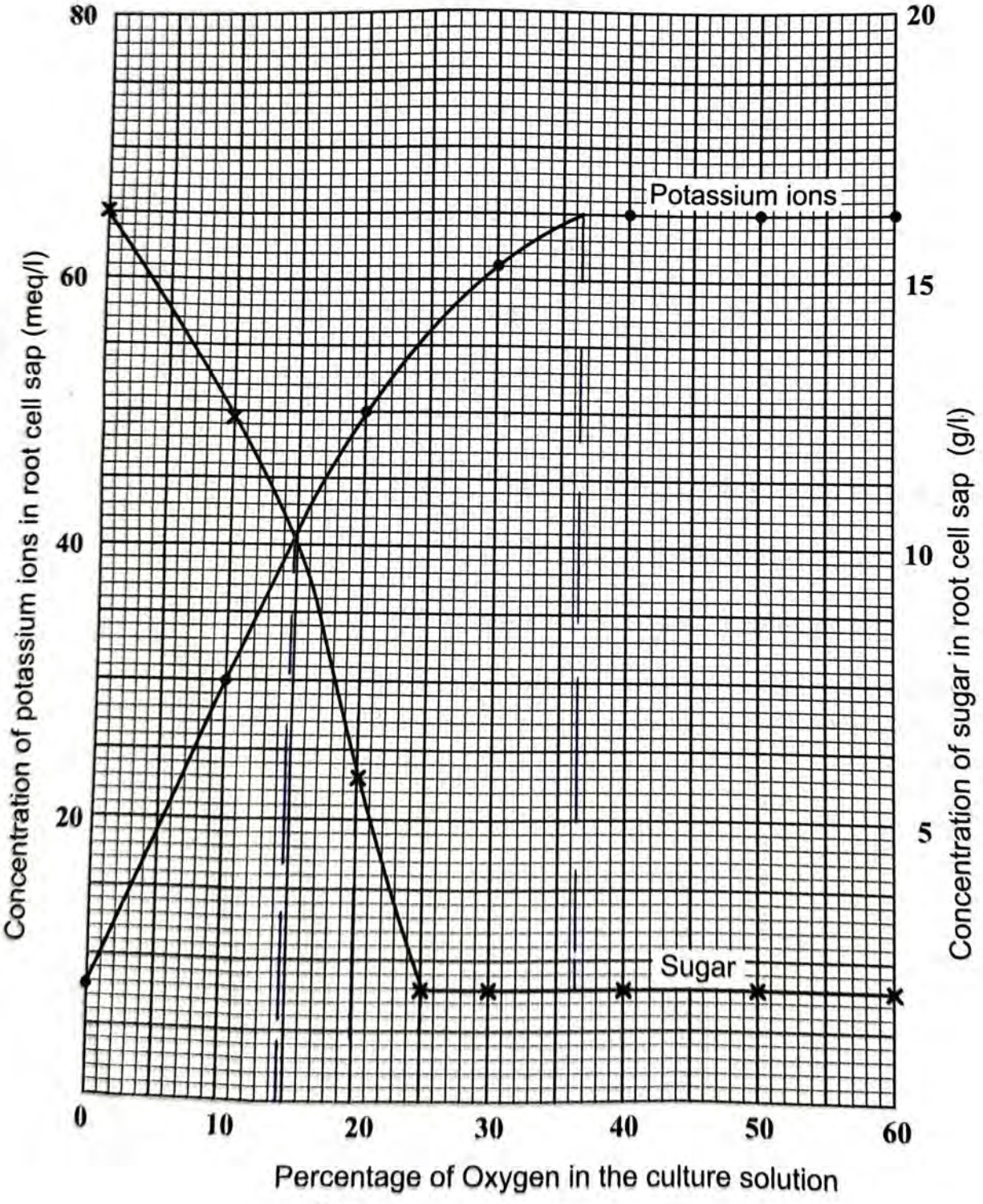

Fig. 1

(a) Describe the variations in the concentration of;
   (i) potassium ions in the root cell sap over different percentages of oxygen in the culture solution. (*03 marks*)
   (ii) sugar in the root cell sap over different percentages of oxygen in the culture solution. (*02 marks*)

(b) Explain the effects of increasing the percentage of oxygen in the culture solution on the concentration of;
   (i) sugar in the root cell sap. (*11 marks*)
   (ii) potassium ions in the root cell sap. (*08 marks*)

(c) Suggest reasons for the presence of potassium ions in the cell sap of the roots at 0 % oxygen in the culture solution. (*06 marks*)

(d) Explain what would happen to the concentration of potassium ions in the root cell sap if in another experiment potassium cyanide was added in small quantities into the culture solution at 20 % oxygen. (*06 marks*)

(e) Explain **two** other factors that may favour absorption of potassium ions. (*04 marks*)

SECTION B (60 MARKS)

Answer any **three** *questions from this section.*
Any additional question(s) answered will **not** *be marked.*

2. (a) What is the importance of osmoregulation in animals? (*02 marks*)

(b) Explain how mammals living in arid areas overcome the problem of water shortage. (*18 marks*)

3. (a) How is light involved in the production of ATP during photosynthesis? (*08 marks*)

(b) Explain how the energy contained in ATP molecules produced during photosynthesis is assimilated in the body of a herbivore. (*12 marks*)

4. (a) What is meant by the term **variation**? (*02 marks*)

(b) Apart from mutation, explain how genetic variation arises in sexually reproducing species. (*10 marks*)

(c) How does polyploidy lead to variation in species? (*08 marks*)

5. (a) What is meant by the term **population** in ecology? (*02 marks*)

(b) What assumptions are made when using capture-recapture method of estimating population size? (*08 marks*)

(c) Explain the ways in-breeding affects a natural population. (*06 marks*)

(d) Suggest factors which may contribute to a climax community being unstable. (*04 marks*)

6. (a) Describe the process of primary growth in plants. (*06 marks*)

(b) Describe the role of gibberellins in plant growth. (*07 marks*)

(c) Explain the meaning and role of seed dormancy in the life cycle of a flowering plant. (*07 marks*)

END

BIOLOGY
(Theory)
PAPER 2
2½ hours

WAKISSHA

Uganda Advanced Certificate of Education

BIOLOGY

(Theory)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of sections,* A *and* B.
- *Answer question* one *in section* A *plus* three *other questions from section* B.
- *Any additional question(s) answered will* not *be marked.*
- *Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically.*
- *Illustrate with well labelled diagrams, wherever necessary.*

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Turn Over

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COMPULSORY QUESTION

The relationship between potassium ion concentration in the roots and sugar consumption at different oxygen concentration was investigated

The table below shows the concentration of potassium ions ($mgcm^{-3}$) and the rate of sugar consumption ($mghr^{-1}$) by roots of a freshly uprooted plant when inserted in a bathing fluid at different oxygen concentration.

Oxygen concentration %	0	2	5	10	30	70
Potassium ion concentration/$mgcm^{-3}$	7	10	21	49	51	44
Rate of sugar consumption/ $mghr^{-1}$	14	16	20	27	34	36

Questions

a) Represent the above information graphically. (9 marks)

b) Compare the effect of oxygen concentration on potassium ion concentration
in the roots and rate of sugar consumption from the graph. (10 marks)

c) Explain the;
(i) presence of potassium ion concentration in the roots without Oxygen concentration. (4 marks)

(ii) relationship between potassium ion concentration and oxygen concentration. (6 marks)

(iii) increase in the rate of sugar consumption with oxygen concentration. (4 marks)

d) State two other factors than oxygen concentration that would affect the rate of potassium ion uptake by roots. (2 marks)

e) With an explanation, predict what would happen if the oxygen concentration was increased up to 98%. (5 marks)

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SECTION B (60 MARKS)

Answer three questions from this section

2. a) Describe the structure and function of the cilia. (10 marks)

b) i) Compare the advantages and disadvantages of the electron microscope with the light microscope. (7 marks)

ii) Describe three different between plant palisade and animal smooth muscle cell as seen under the electron microscope. (3 marks)

3. a) With example, describe the variety and nature of bonds found in biological molecules. (12 marks)

b) In a large sexually reproducing population, a fatal disease can never wipe out the whole population. Discuss in agreement with the above statement. (8 marks)

4 a) What is a limiting factor in reference to photosynthesis? (3 marks)

b) Give an account of the role of each of the following in photosynthesis;

i) H_2O (5 marks)

ii) Light (4 marks)

c) How do plants living in shadows of tall plants able to obtain sufficient light photosynthesis. (8 marks)

5. a) i) Describe the composition and formation of lymph. (6½ marks)

ii) List three functions of lymph. (1½ marks)

b) Explain how various hormones interact to control blood pressure. (12 marks)

6. a) Describe how support in plants is achieved by the following;

i) Mechanical strengthening . (4 marks)

ii) Turgor pressure. (4 marks)

b) How is muscular movement effected in fish? (6 marks)

c) State the adaptations of fast moving animals to increase their speed. (6 marks)

END

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P530/2
BIOLOGY
(Theory)
Paper 2
DECEMBER, 2020
2½ hours

JINJA JOINT EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS – DECEMBER, 2020

BIOLOGY

(THEORY)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Answer question ONE in section A plus three others from section B.

Candidates are advised to read questions carefully, organize their answers and present them precisely and logically.

Illustrate, whenever necessary, with well labelled diagrams.

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SECTION A (40MARKS)

1. When DDT was first manufactured, it was applied as a method of controlling housefly populations over time. Populations of two species of houseflies and that of a spider were monitored over a period of thirteen months. Shortly after the second month of data collection was when the DDT was applied and it was established that the DDT was not toxic to the spider. The results of the study were recorded in the table below. Study the table carefully and answer the following questions:

Table 1

Time(months)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Housefly C (x1000)	35	35	35	20	2	7	17	32	50	65	79	88	82	81
Housefly F (X1000)	79	82	79	80	62	40	17	0						
Spider W (X1000)	72	76	81	78	66	56	49	46	46	48	55	70	85	86

a. Plot suitable graphs to represent the results of this study. (6 marks)

b. i. How does the population of the spider relate with the population of houseflies in this investigation? (10 marks)

ii. Explain the relationship in the populations in (b) (i) above. (12 marks)

c. i. How do you explain the effect of the use of DDT on the observed trends of the three populations of the animals? (8 marks)

ii. Basing on the information given, what would happen if DDT was toxic to the spider? (4 marks)

SECTION B: (60 MARKS)

2. a. Describe the mechanism of forward locomotion of a cartilaginous fish like Scyliorhinus fish(dogfish) . (10 marks)

b. Describe how the structural features in birds are related to their flight. (10 marks)

3. a. What is meant by transpiration? (3 marks)

b. Explain how the following factors affect transpiration:

i. Temperature. (4 marks)

ii. Sunken stomata in leaves. (5 marks)

c How does transpiration benefit plants? (8 marks)

4 a. Describe the term ecosystem. (2 marks)

b. Precisely outline the information required to describe the make-up of an ecosystem. (8 marks)

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C. Describe the flow of energy through ecosystems and describe the various ways in which man's activities can influence the flow at all levels in terrestrial ecosystems. (10 marks)

5 a i. Distinguish photoautotrophic from chemoheterotrophic nutrition. (2 marks)

ii. Describe the ways in which the structure of the leaf contributes to its successful functioning. (13 marks)

b i How does the absorption spectrum of chlorophyll a differ from that of chlorophyll b? (3 marks)

ii. Explain the effect of lowering oxygen concentration on C3 and C4 photosynthesis. (2 marks)

6. a. Compare the structures of the photoreceptor cells of the mammalian eye. (6 marks)

b. Describe how the mammalian eye accommodates objects. (7 marks)

c, Describe the trichromatic theory of colour vision. (7 marks)

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P530/2
BIOLOGY
(Theory)
PAPER 2
July/August 2019
2 1/2 hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

BIOLOGY

(Theory)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of sections,* **A** *and* **B**.
- *Answer question* **one** *in section* **A** *plus* **three** *other questions from section* **B.**
- *Any additional question(s) answered will* **not** *be marked.*
- *Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically.*
- *Illustrate with well labelled diagrams, wherever necessary.*

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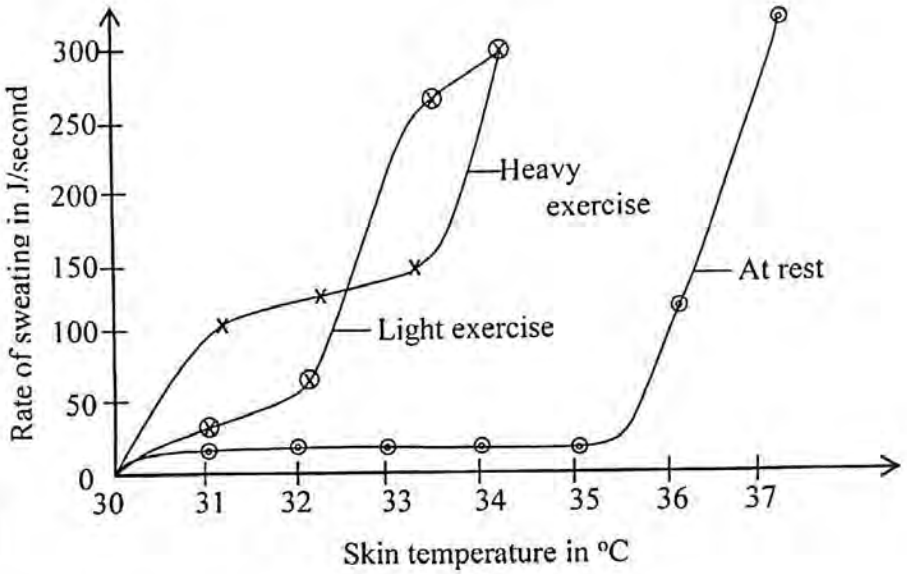
SECTION A (40 MARKS)

COMPULSORY QUESTION

1. (a) The graph below shows results obtained from an investigation to determine the effect of skin temperature on the rate of sweat production in a land mammal during rest, light exercise and heavy exercise. Study the data provided and answer the questions that follow;



i) Describe the effect of increasing skin temperature on the rate of sweating during light exercise. (03 marks)

ii) Compare the rate of sweat production of the mammal under light exercise and at rest. (06 marks)

iii) Explain why there is general increase in the rate of sweating under the conditions in the investigations? (04 marks)

(b) Account for the observed changes in the rate of sweat production during;

(i) Rest (03 marks)

(ii) Light exercise (05 marks)

(iii) Heavy exercise (04 marks)

(c) Describe how increase in body temperature of the mammal results in increased sweat production. (05 marks)

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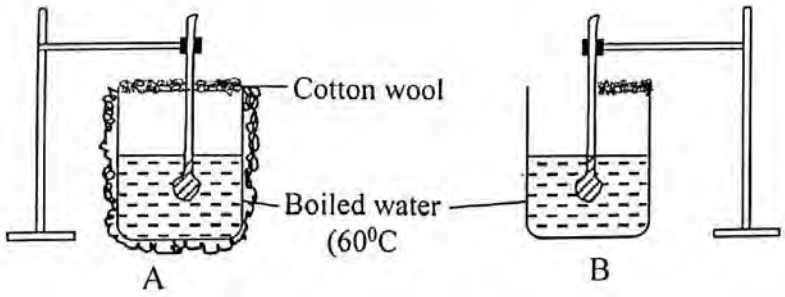
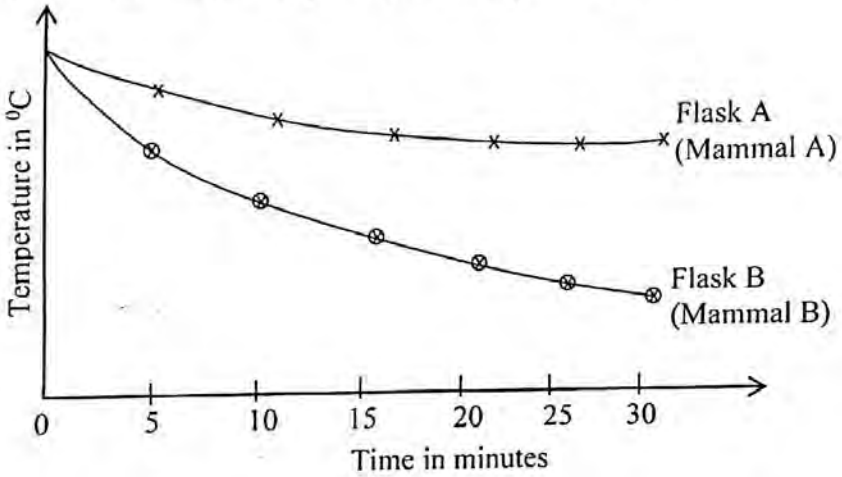
(d) In an experiment to determine the effect of amount of fur on heat loss in two mammals, a Biologist used two flasks containing boiled water at 60°C labelled A and B representing the two animals. Flask A was completely covered with cotton wool while flask B was partially covered as illustrated below. Temperature recordings were taken at 5 minutes interval.



The results obtained were plotted in the figure below.



(i) Explain the observed differences in temperature recordings from the two flasks. (04 marks)

(ii) Suggest the habitats in which each of the represented mammals A and B lives. (02 marks)

(iii) Suggest the mechanisms other than those represented in flask A, that are employed to maintain body temperature in mammal A. (04 marks)

SECTION B (60 MARKS)

*Answer **three** questions from this section.*

2. (a) Describe the process of energy flow in an eco-system. (04 marks)

(b) i) Describe the factors that cause organisms to become endangered. (10 marks)

ii) Suggest reasons why large mammals are more prone to extinction than small mammals. (06 marks)

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3. (a) Outline the properties of receptors. (05 marks)

(b) Explain the necessity for organisms to respond to changes in their environment. (03 marks)

(c) Describe the role played by the organ of corti in the mammalian ear. (12 marks)

4. (a) Explain the physiological adjustments in the human body during an exercise. (10 marks)

(b) Outline three features of the immune system. (03 marks)

(c) Describe how a human body responds to invasion by a pathogen. (07 marks)

5. (a) Describe the role of the following during protein synthesis.

i) tRNA (03 marks)

ii) mRNA (04 marks)

(b) Compare protein synthesis with DNA replication. (08 marks)

(c) Describe the characteristics of genetic code. (05 marks)

6. (a) How is the vascular tissue formed in plants? (10 marks)

(b) i) With examples of plant parts, describe the effects of auxin distribution caused by various unidirectional factors. (06 marks)

ii) Outline the roles of auxins in plants. (04 marks)

END

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P530/2
BIOLOGY
(Theory)
Paper 2
AUGUST, 2019
$2\frac{1}{2}$ *hours*

JINJA JOINT EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS – AUGUST, 2019

BIOLOGY

(THEORY)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

*Answer question **ONE** in section **A** plus three others from section **B**.*
Candidates are advised to read questions carefully, organize their answers and present them precisely and logically.

Illustrate, whenever necessary, with well labelled diagrams.

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SECTION A (40MARKS)

1. The graph in **Figure 1**shows the result of an experiment on the uptake of minerals by the roots of two crop plants of a species grown in pots, where cyanide was added to the soil for one of the plants.

   The table in **Figure 2** shows the results obtained after a period of four weeks in an experiment on the effects of nitrates and phosphates to the growth and development of the same crop plant species in experiment 1.

Fig.1.

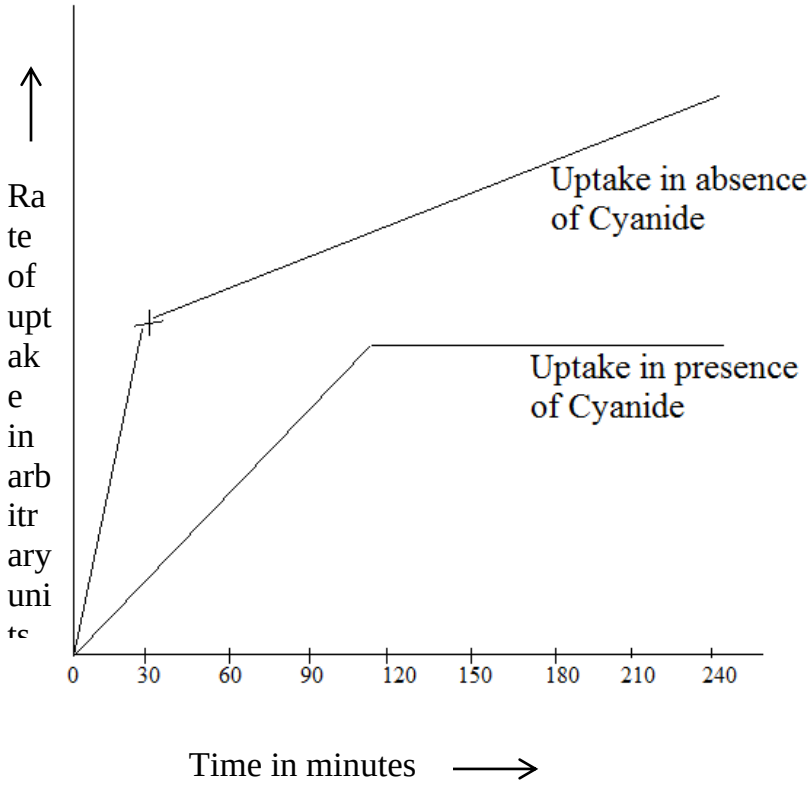

Fig.2.

Nutrients in soil In the pots	**Fresh mass (g)**	
	Shoot system	**Root system**
Soil containing all minerals	2.84	0.61
Soil lacking nitrates	2.01	0.31
Soil lacking phosphate	1.80	0.06

(a). (i). Suggest the explanation for the differences in the rates of uptake which occurred in the two plants. (12marks)

(ii). Give **two** other factors that may have similar effect to the uptake of minerals by plants as Cyanide. (02marks)

(b).(i). State **four** conclusions which can be drawn from the result indicated in figure2. (04marks)

(ii). Explain why lack of each of the minerals indicated in the table above produce the above results. (06marks)

(c).(i).Outline the factors that contribute to mineral salt deficiency in soil for agriculture. (04marks)

(ii). Explain how some crop plants are able to obtain nitrogen in nitrate deficient soils. (6marks)

(d). Describe how the nitrates taken up by the crop plants above is made available to the cells in the human body. (05marks)

SECTION B (60MARKS)

2. (a). Distinguish between natural selection and artificial selection (04marks)

(b). Explain how man has used the knowledge of selection to his benefits in agriculture. (08marks)

(c). Discuss in evolutionary terms, the long-term effects of excessive use of antibiotics and pesticides. (08marks)

3. (a). Explain each of the following;
   (i). Absence of a specialised system for transport of materials in unicellular eukaryotes. (03marks)
   (ii). Lack of specialised system for transport of gases in flowering plants. (04marks)
   (iii). Restricting haemoglobin to red blood cells in the mammalian blood. (04marks)
   (b). Describe how the structure of mammalian heart caters for the transport needs of mammals. (09marks)

4. (a). Compare the fixation of carbon dioxide in C3 and C4 plants. (08marks)

   (b).(i). How does the principle of limiting factors indicate that photosynthesis is a multi-stage process? (02marks)

   (ii). Explain how man has used the knowledge of limiting factors to increase crop productivity. (10marks)

5. (a). Describe how substances used to eliminate organisms in the environment Considered to be harmful to humans may affect other non- targeted individuals including the carnivorous birds. (08marks)
   (b). Explain the advantages which omnivorous mammals have when they feed on food material obtained from animal bodies over feeding on plant materials. (08marks)
   (c). How does the difference in the diets of herbivorous and carnivorous mammals related to the structure of their guts? (04marks)

6. (a). Explain the significance of feedback inhibition in the following.
   (i). Maintaining suitable internal environment of human body. (06marks)
   (ii). Regulation of the population size of animals. (05marks)

(b). Explain why the negative feedback mechanisms do not necessarily apply to human populations. (09marks)

P530/2
BIOLOGY
(Theory)
Paper 2
July/August 2019
2 ½ hours

UGANDA TEACHERS' EXAMINATIONS SCHEME
Uganda Advanced Certificate of Education
JOINT MOCK EXAMINATIONS
BIOLOGY
(THEORY)
Paper 2
2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of sections **A** *and* **B**.
Answer question **one** *in section* **A** *plus three others from section* **B**.
Candidates are advised to read the questions carefully, organize their answersand present them precisely and logically, illustrating with well labeled diagrams where necessary.

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Turn Over

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SECTION A (40 marks)

1. A. The graph in figure I shows the membrane potential of the post synaptic membranes of a neurone after application of acetylcholine to the synapse, thereby producing an excitatory post synaptic potential (ESPSP)

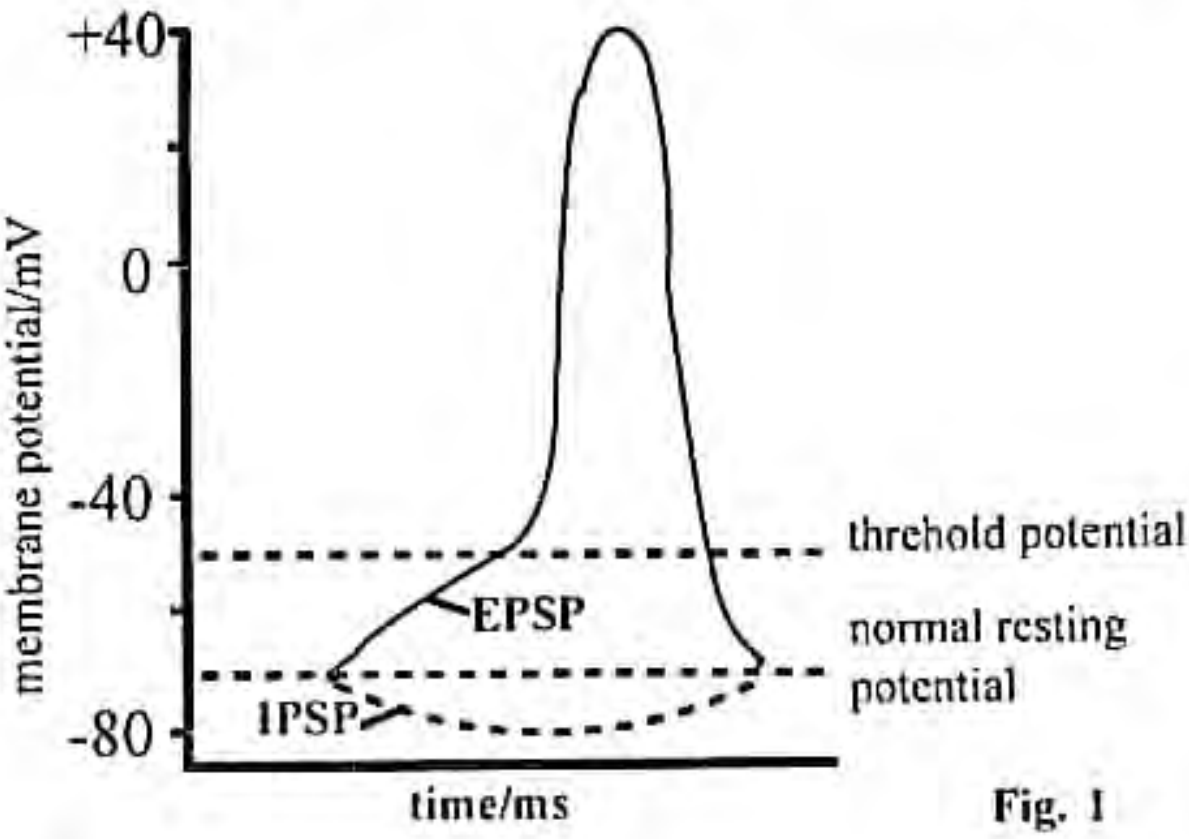

Fig. 1

(a) (i) What is the cause of the resting potential of -70mV? (03 marks)

(ii) Describe the molecular events which result in the changes in membrane potential shown on the graph. (10 marks)

(iii) A different transmitter substance was applied to the synapse. The change in membrane potential of the post-synaptic membrane is illustrated by the curve labeled IPSP. Explain the cause of this. (08 marks)

B. A theory of colour vision suggests that a photoreceptor has a pigment that exists in three forms namely; blue, red and green according to the colour of the wave length observed by each. The absorption of different wave lengths by the three forms of photoreceptor pigments is given in the table below.

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Study the information and answer the questions that follow.

Wave length	Amount of light observed as a percentage of maximum		
(nm)	Red cones	Green cones	Blue cones
660	5	0	0
600	75	15	0
570	100	45	0
550	85	85	0
530	60	100	10
500	35	75	30
460	0	20	75
430	0	0	100
400	0	0	30

(b) From the data, explain why light of wave length.

(i) 430nm appears blue (03 marks)

(ii) 550nm appears yellow (03 marks)

(iii) 570nm appears orange (04 marks)

(c) Explain why two closely placed small objects can be easily distinguished by cones that rods. (09 marks)

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SECTION B (60 MARKS)

2. (a) Explain the modern concept of evolution by natural selection. (10 marks)

(b) Explain how features of the embryos in the early stages of development and the possession of vestigial organs support organic evolution. (10 marks)

3. (a) Distinguish between blood circulation of fish and mammals. (06 marks)

(b) Describe blood circulation in insects. (07 marks)

(c) Explain cell mediated immune response in humans. (07 marks)

4. (a) Distinguish between primary and secondary succession. (03 marks)

(b) Describe primary succession on a bare rock. (14 marks)

(c) Outline the characteristics of a climax community. (03 marks)

5. Describe the location and functions of membranes in enkaryotic cells. (20 marks)

6. (a) Explain why a single base deletion from one DNA molecule usually causes a greater effect than the replacement of one base by another different base. (08 marks)

(b) Using a named example, describe how gene mutation may affect a genotype of an organism.

END

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P530/2
BIOLOGY
(Theory)
Paper 2
July/Aug. 2018
2½ hrs

UGANDA TEACHERS' EXAMINATIONS SCHEME

Uganda Advanced Certificate of Education

JOINT MOCK EXAMINATION

Biology

(Theory)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of **two** *sections;* **A** *and* **B**.

Section **A** *is compulsory.*

Answer any **three** *questions in section* **B**.

All *answers* **must** *be written in the answer booklet provided.*

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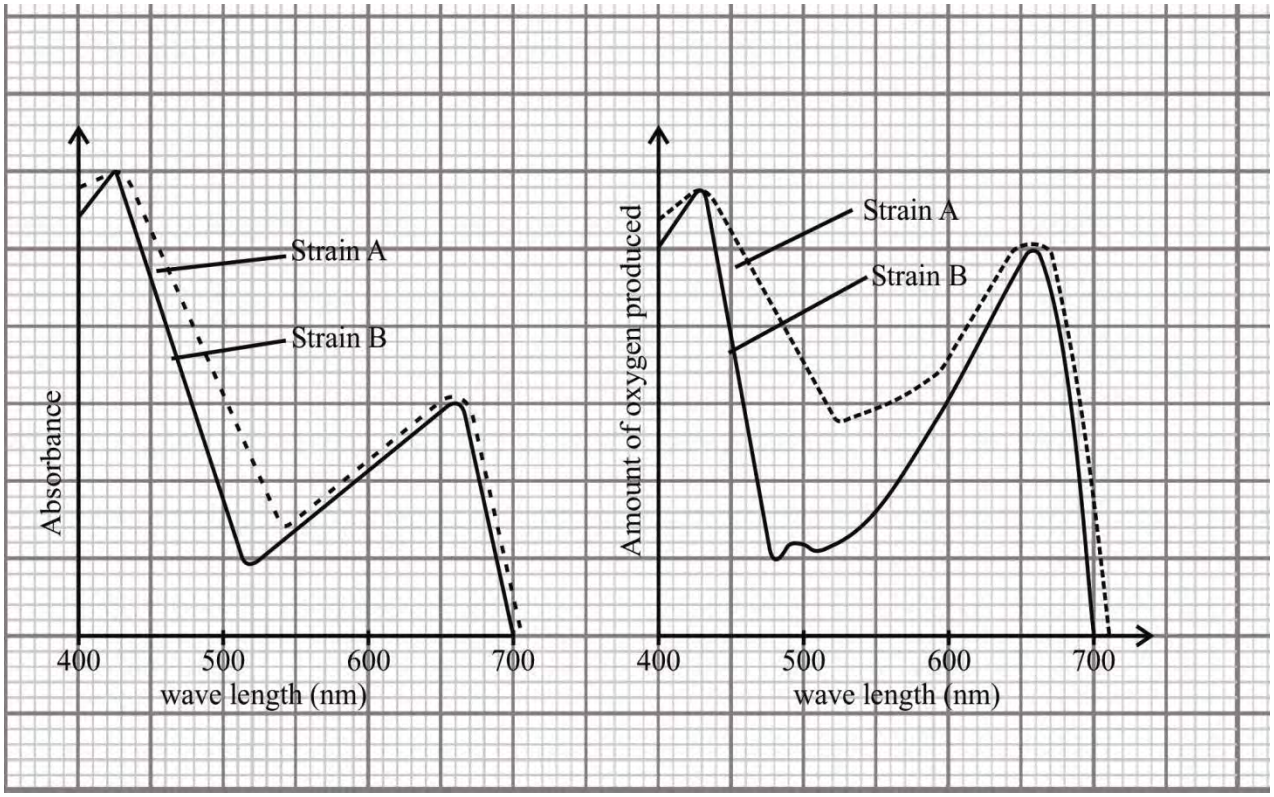
Turn Over

SECTION A: (Compulsory)

1. Investigations were carried out using two strains of the same species of unicellular algae, one of which, one of which was a mutant that could not survive long periods of increasing illumination. Light of known wave length was passed through a tube containing algae and measurements were taken both of oxygen produced and light transmitted and the results were shown below;



(a) Compare the action spectrum of the two strains. (07 marks)

(b) Explain the changes in amount of oxygen produced by strains ***A*** and ***B*** of algae. (14 marks)

(c) Suggest the precautions that can be undertaken to obtain accurate results from the above experiment, give reasons for your answer. (10 marks)

(d) (i) What other methods can be used to obtain the result of the action spectrum above (02 marks)

(ii) Explain why the method used above to obtain the action spectrum is inaccurate. (02 marks)

(e) (i) State with reason the strain which is mutant. (02 marks)

(ii) How are algae in the experiment adapted for photosynthesis? (02 marks)

SECTION B: *(Answer* **three** *questions)*

2. (a) Describe the mechanism for transport of sucrose in plants from photosynthetic cells into the sieve tubes in leaves. (07 marks)

(b) Explain the following evidences to support phloem as the tissue for translocation of sucrose.

(i) Back ringing of the tree back. (04 marks)

(ii) Use of radio-active tracers. (04 marks)

(iii) Analysis of sap from aphid's stylet (05 marks)

3. (a) Explain why a single base deletion from one DNA molecule usually causes greater effect than replacement of one base by another. (06 marks)

(b) Using in example of sickle cell anaemia, describe how a gene mutation may affect a phenotype of an organism. (14 marks)

4. (a) What is meant by the term natural resources? (04 marks)

(b) Discuss the significance of conservation of natural resources in an ecosystem. (16 marks)

5. Describe how energy of a glucose molecule is made available for living processes. (20 marks)

6. (a) Describe the structure of a human Retina. (10 marks)

(b) Explain the trichromatic theory of colour vision (06 marks)

(c) How does the human eye adjust itself in order to focus on a near object? (04 marks)

END

P530/2
BIOLOGY
PAPER 2
$2^1/_2$ hours
NOV 2020

KINGS COLLEGE BUDDO

Uganda Advanced Certificate of Education
BIOLOGY MOCK EXAMINATIONS, 2020
PAPER 2
2 hours 30 minutes.

INSTRUCTIONS TO CANDIDATES:
*Answer question one in section **A** plus three others from section **B**.*

Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically, illustrating with well labeled diagrams where ever necessary.

Write on the answer sheet , your name, stream, index number and the questions attempted in their order as shown in the table.

Question	Marks
Total	

SECTION A (40 MARKS)

1. Tape worms naturally secrete by hydrogen ions into the intestinal lumen of their hosts so that the carrier proteins in their cell membrane binds with more glucose molecules.

In an experiment on a dog that had been infested with tapeworms, the dog was given a glucose solution and then an acidic solution injected into its intestinal lumen.

The experiment was repeated using an alkaline solution. Figures 1(a) and (b) shows the efficiency of absorption of glucose by the host and parasites.

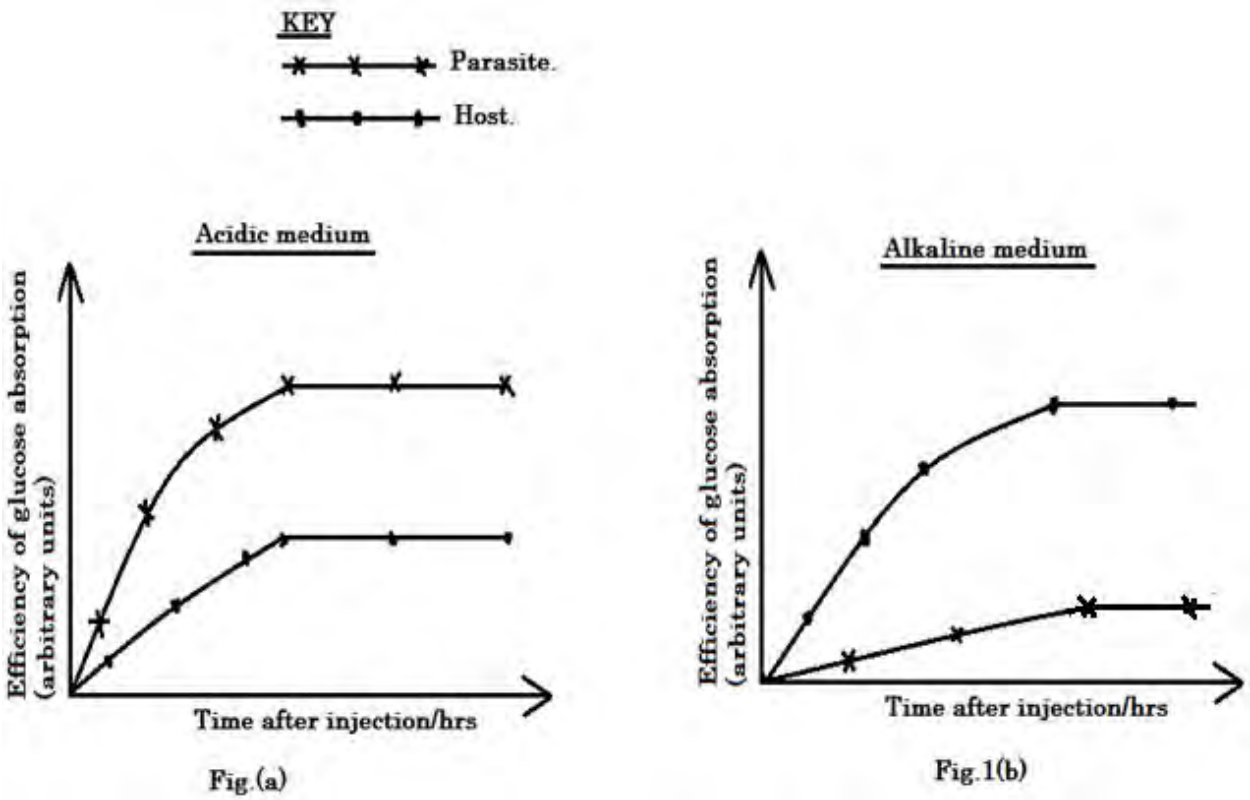
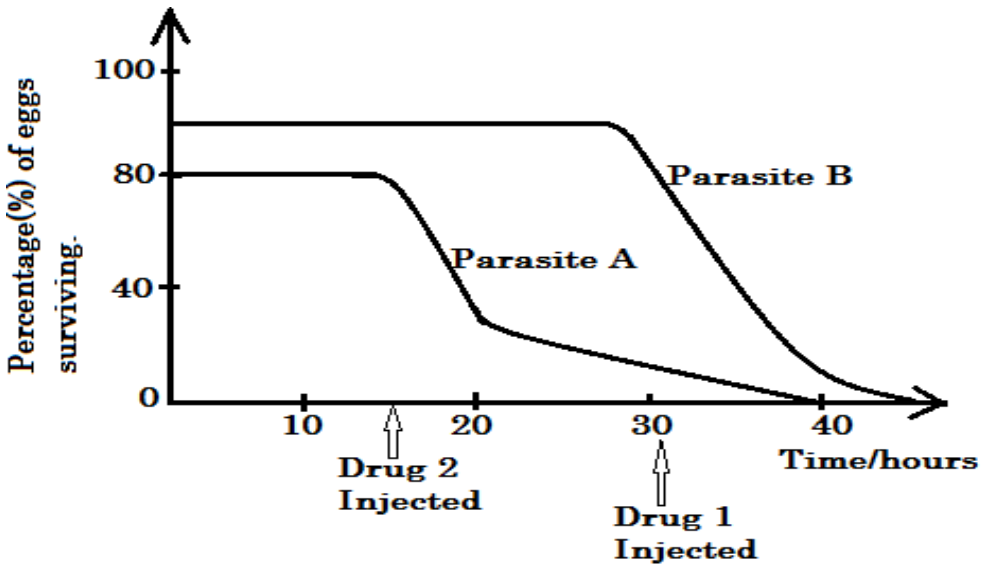


Fig.(a) Fig.1(b)

In another experiment on a dog infested by two different parasites, two drugs were separately used to eradicate the parasites.

Drug 1 was injected into the blood while drug 2 was injected into the intestinal lumen. Then the percentage of eggs of each parasite that survived after injection of the drugs was determined. Figure 2 shows the results of the investigation.



Use the above information given to answer the questions that follow.

(a)Compare the efficiency of glucose absorption by the parasites and host in,

(i) Acidic medium. (03 marks)

(ii) Alkaline medium. (03 marks)

(b) Explain the difference in the efficiency of glucose absorption in each medium.

(i) Acidic medium. (03 marks)

(ii) Alkaline medium. (03 marks)

(c) Explain the trend of efficiency of glucose absorption by the parasites in acidic medium. (06 marks)

(d) From figure 2, describe the variation in the percentage of eggs surviving for each parasite.

(i) Parasite A. (03 marks)

(ii) Parasite B. (03 marks)

(e) Explain the response of each parasite to the drugs given.

(i) Parasite A. (05 marks)

(ii) Parasite. (05 marks)

(f) Other than absorption of the host nutrients, suggest ways the tapeworm would affect the drug. (02 marks)

(g) What benefits does the tapeworm gain from living in the dog's intestine lumen. (3marks)

SECTION B (MARKS)

2. (a) (i) Describe events that occur leading to sickle cell anaemia disease. (07 marks)

(ii) How may occurrence of sickle cell anaemia lead to evolution. (04 marks)

(b) Explain how double fertilization is,

(i) Achieved in flowering plants. (05 marks)

(ii) Prevented in humans. (04 marks)

3.(a) State characteristic features common to all counter current systems. (04 marks)

(b) How is the mammalian kidney,

(i) Adapted to carry out efficiently functions related to counter current system in mammals. (06 marks)

(ii) Regulate pH in mammalian blood at a set point. (10 marks)

4. (a) Compare each of the following,

(i) Acetylcholine and noradrenaline. (07 marks)

(ii) CAM plants and C4 plants. (06 marks)

(b) Explain how transmission of nerve impulse is inhibited across a chemical synapse. (07 marks)

5.(a) Describe the trend of succession that occurs on a previously burnt and abandoned piece of land. (08 marks)

(b) Explain appropriate conservation methods for each of the following natural resources,

(i) Wild life. (05 marks)

(ii) Endangered species. (07 marks)

6. (a) Differentiate between polysaccharides and polypeptides. (05 marks)

(b) Describe functions for various polysaccharides. (09 marks)

(c) Explain features of polysaccharides that make them ideal organic chemical compounds for storage. (06 marks)

END

THE REPUBLIC OF UGANDA

Ministry of Education and Sports

A' Level

SELF STUDY

Biology

NCDC
NATIONAL CURRICULUM
DEVELOPMENT CENTRE

BIOLOGY SELF-STUDY MATERIALS

Senior Five

Topic: Cell Biology

By the end of this topic, you should be able to describe the structure and functions of the animal cell ultra-structure as visible under the electron microscope. You should also be able to describe the fluid-mosaic model of the plasma membrane.

Activity 1: Revision

Figure 1 below shows the structure of a liver cell as seen using the electron microscope.

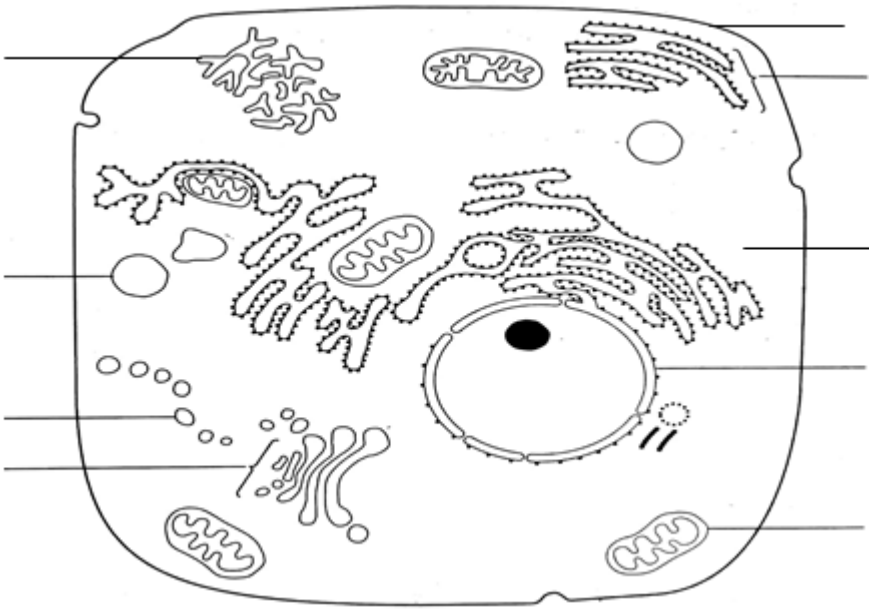


Fig. 1

1. Name the parts of the cell labeled on the diagram.
2. From the diagram, identify the cell organelles which are bound by:
   i) a single membrane
   ii) a double membrane
3. State the functions of membranes within a cell.
4. Figure 2 below shows the bacterial cell.

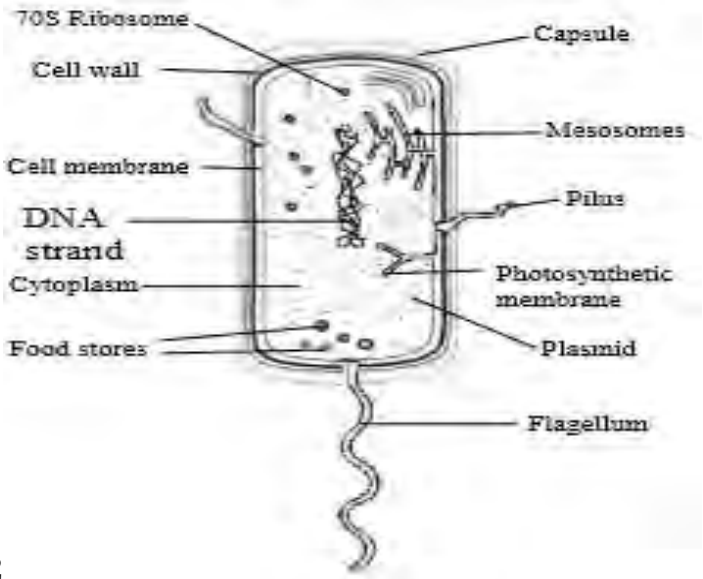


Fig. 2

1. Discuss the adaptations of a bacterial cell.
2. State the differences between the animal cell and a bacterial cell.

Activity 2

Figure 3 is a fluid mosaic model of a plasma membrane.

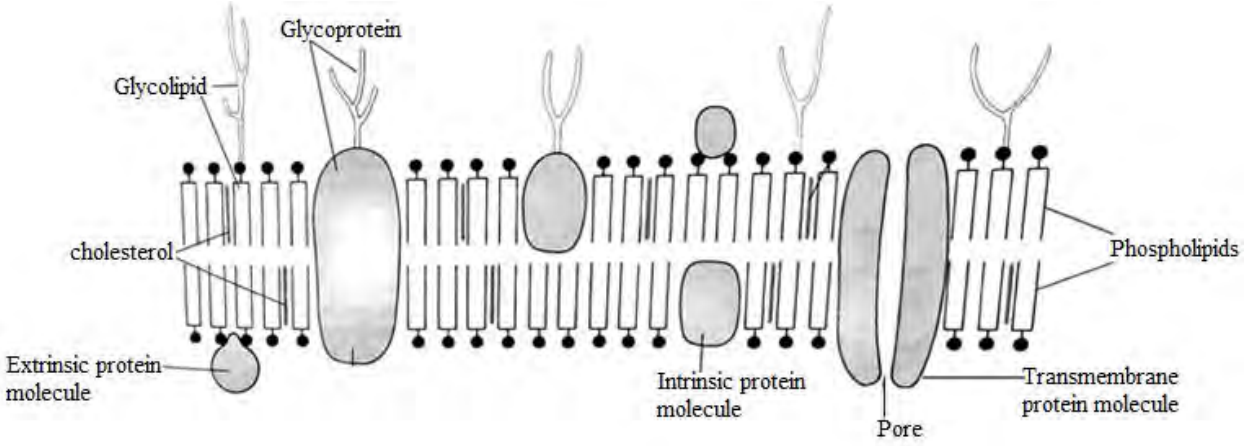
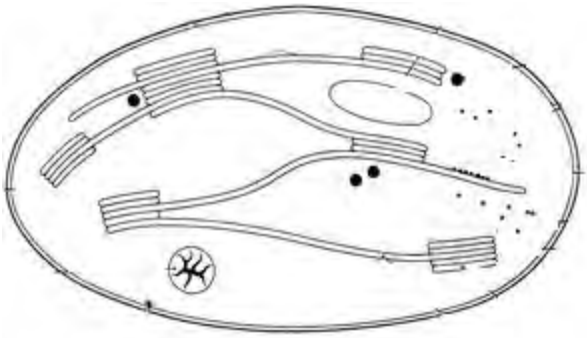


Fig. 3

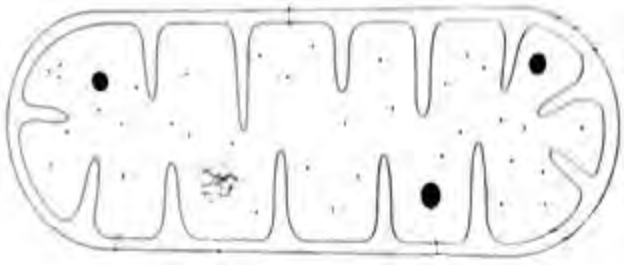
1. Describe the structure of the plasma membrane as shown above.
2. State the functions of the plasma membrane.
3. How is the structure of the plasma membrane related to its functions?

Activity 3

Observe the following drawing of chloroplast and mitochondrion.



Chloroplast



Mitochondrion

1. State the function of each of organelles in a cell.
2. Describe the structure of each organelle.
   i) chloroplast
   ii) mitochondrion
3. State differences between the chloroplast and mitochondrion.
4. Discuss the adaptations of each structure to its function.

BIOLOGY SELF-STUDY MATERIALS
Senior Six

Topic: Nutrition
By the end of this topic, you should be able to explain the environmental and internal factors influencing the rate of photosynthesis.

Activity 1: Revision
Figure 1 shows the rate of photosynthesis of tomato plants under different environmental conditions.

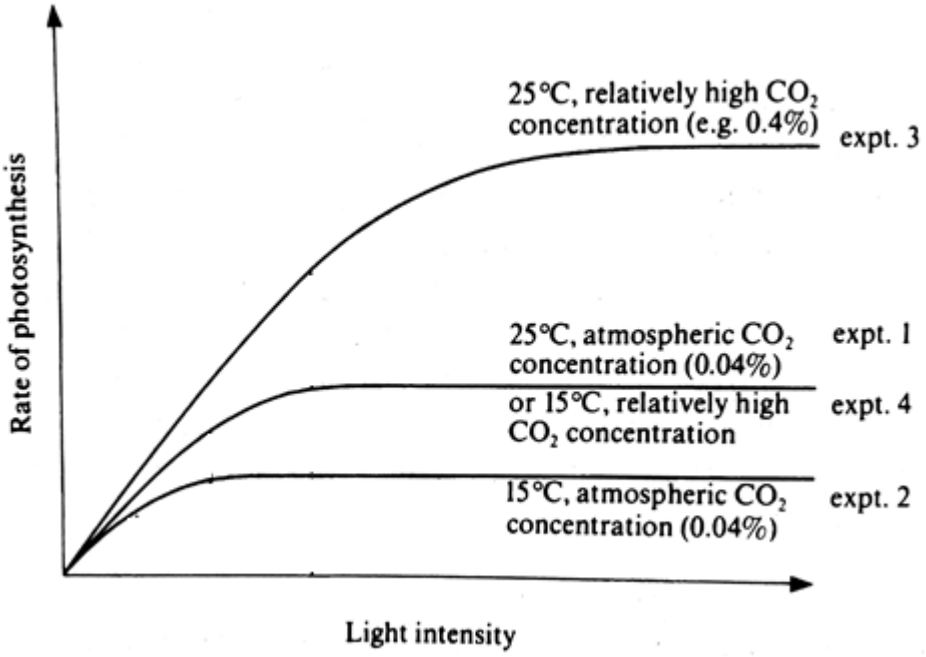


Fig. 1

1. What is meant by a limiting factor?
2. State the limiting factor in each of the experiments 1, 2, 3, and 4.
3. Explain the results in:
   i) Experiment 1
   ii) Experiment 2
   iii) Experiment 3

Activity 2
In an investigation to study the effect of light intensity on the physiology of Spirogyra, the amount of Phospoglyceric acid (PGA), Ribulose biphosphate (RuBP), and Sucrose, were

determined at different times in the presence of light. At the 35th minute, light was removed completely.

Figure 2 below shows the variation of the amount of PGA, RUBP and Sucrose with time.

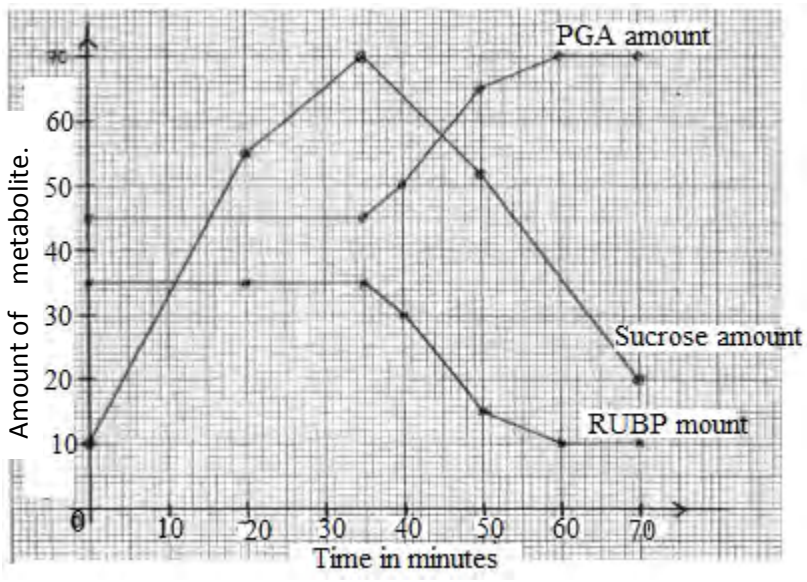


Fig. 2

1. Compare the changes in the amounts of PGA and RUBP with time.
2. Account for the changes in the amount of:
   i) PGA
   ii) RUBP
3. Explain the changes in the amount of PGA and RUBP with time if carbon dioxide was used instead of light.
4. State how the chloroplast is adapted for:
   i) light dependent reactions of photosynthesis.
   ii) light independent reactions of photosynthesis.

Topic: Homeostasis

By the end of this topic, you should be able to describe the structure and function of the nephron.

Activity 1

Figure 3 shows changes in salt (ion) concentration in region C and of the fluid as it passes through part of the nephron of a mammalian kidney.

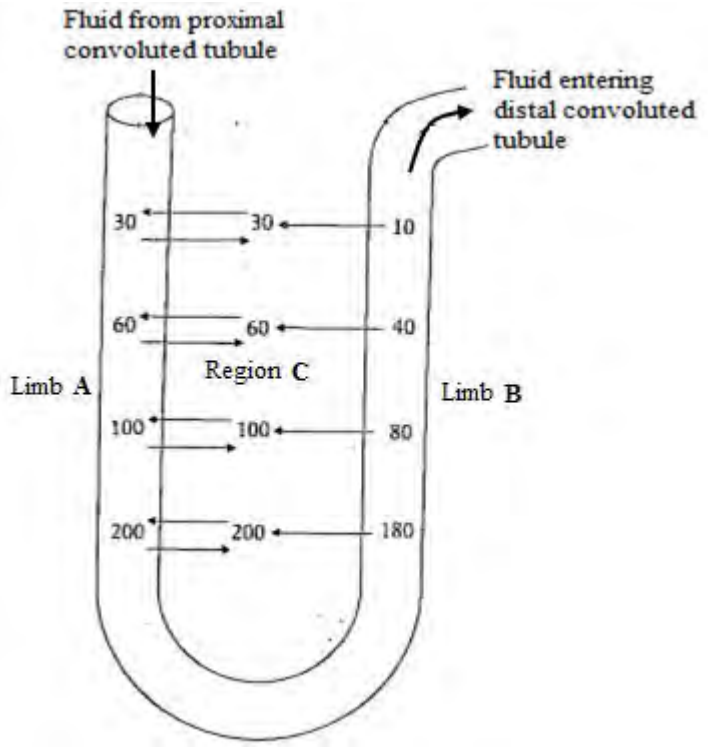


Fig. 3

1. State and explain the principle illustrated in Figure 3 in relation to osmoregulation.
2. Explain the changes in concentration of the fluid in:
   i) Region C
   ii) Limb A
   iii) Limb B
3. State the significance of the changes in concentration of the fluid in Figure 3 to a mammal.
4. Suggest the change in structure of Figure 3 in a mammal living in conditions drier than that of the mammal whose nephron is shown. Give reasons for your answer.

NCDC
NATIONAL CURRICULUM
DEVELOPMENT CENTRE

National Curriculum
Development Centre ,
P.O. Box 7002,
Kampala.
www.ncdc.go.ug

P530/2
BIOLOGY
(Theory)
Paper 2
Nov./Dec. 2020
$2^1/_2$ hours

WAKISO-KAMPALA TEACHERS' ASSOCIATION (WAKATA)

WAKATA MOCK EXAMINATIONS 2020

Uganda Advanced Certificate of Education

BIOLOGY

(THEORY)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

Answer question **one** *in section* **A** *plus* **three** *other questions from section* **B**

You are advised to read questions carefully, organize your answers and present them logically and precisely.

Illustrate wherever necessary with well labeled diagrams

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Turn Over

SECTION A (40 MARKS)

1. An investigation into the composition and number of arthropods found in forest and shrub Savannah habitats was carried out. The table below shows the results of the investigation.

Type of arthropods	**No. of arthropods**	
	Forest	**Savannah**
Arachnids other than mites	30	12
Winged insects other than mosquitos	150	38
Mites	200	28
Larvae of winged insects	80	12
Millipedes	84	10
Centipedes	12	12
Woodlice	52	10
Mosquitoes	180	10
Beetles	30	140

(a) Represent the above information graphically. *(08marks)*

(b) Comment briefly on the relative of the arthropods in both the forest and savannah habitat. *(04marks)*

(c) Account for the suitable preference shown by;

(i) The beetles *(04marks)*
(ii) The millipedes *(04marks)*
(iii) Woodlice *(04marks)*

(d) Suggest **two** suitable methods which could possibly have been used to determine the
(i) number of winged insects in the forest. *(05marks)*
(ii) Millipedes in the forest and savannah and describe in detail the procedures of the method suggested. *(05marks)*

(e) (i) Describe precisely the challenges faced by grasses in the savannah habitats *(03marks)*

(i) Describe the adaptations of such grasses to overcome such challenges *(03marks)*

SECTION B (60 MARKS)

2. (a) What is ment by **alternation of generations**? *(02marks)*

(b) Describe the alternation of generation of a fern. *(13marks)*

(c) Outline the differences of alternation of generation between the **moss** and **ferns**. *(05marks)*

3. (a) Explain how starch is made in C_4 plants. *(15marks)*

(b) Why are C_4 plants more efficient at carbon dioxide fixation than C_3 plants? *(05marks)*

4. (a) Describe the synthesis of genetic instruction by the nucleus for enzyme production.

(b) Describe the named hypothesis of DNA replication.

5. (a) Describe the structure of nuero-muscular junction. *(10marks)*

(b) Explain the series of events which occur when an impulse arrives at the cholinergic nerve-gut wall musle-junction. *(10marks)*

6. (a) What is meant by **phytochromes**? *(05marks)*

(b) Explain geotropism in plants. *(08marks)*

(c) Describe how phytochrome control flowering in tobacco. *(07marks)*

END

P530/2

BIOLOGY

(Theory)

Paper 2

June, 2017

2 ½ Hours

Uganda Advanced Certificate of Education

BIOLOGY

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- **This paper consists of six questions.**
- **Answer question one in section A plus three others from section B.**
- **Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically, illustrating with well labeled diagrams wherever necessary.**

SECTION A: (40 MARKS)

The figure shows the changes in leaf area index (ratio of leaf surface to soil surface (m^2 cm^{-2}) of two species of clover, ***Triforium repens*** and ***Triforium fragiferum***, growing in a pure and mixed stand.

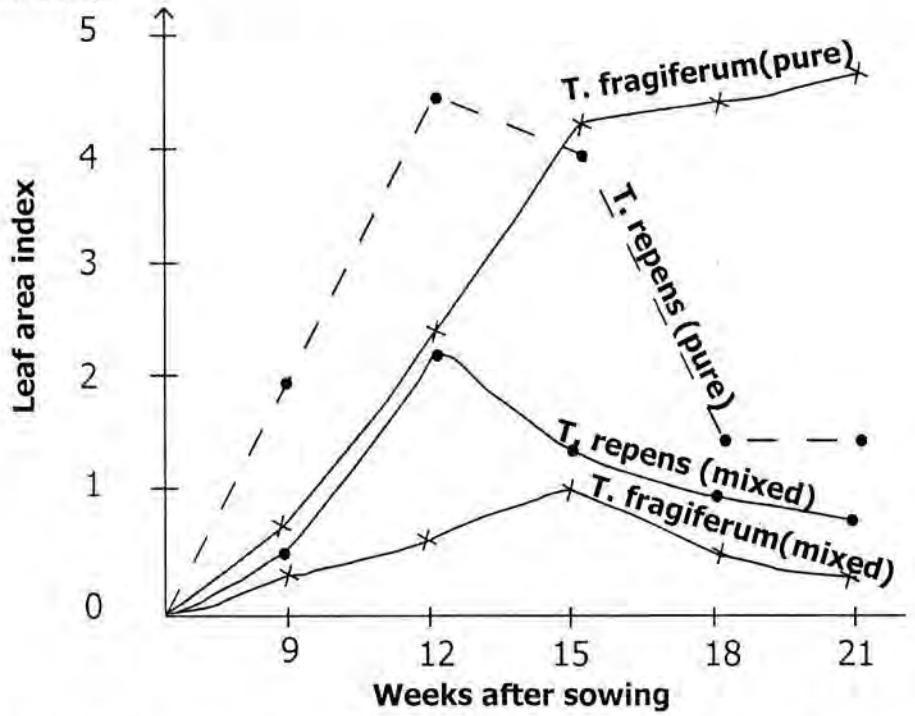


Table 1 shows the characteristics of the petioles and leaf size of the two species of clover.

	Characteristic	
	T.fragiferum	***T.repens***
Petiole length	Long	Short
Leaf size	Large	Small

Use the information in the figure and table to answer the questions that follow.

(a) Compare the leaf area index of ***Trifolium repens*** and ***T.fragiferum*** in the;

(i) pure stands (06marks)

(ii) mixed stands (06marks)

(b) Explain the trend in leaf area index for ***Trifolium repens*** in pure stands. (10marks)

(c) Explain the difference in growth rate of the two species in mixed stands. (07marks)

(d) Explain why ***Trifolium fragiferum*** continues to grow after the peak of Trifolium repens? (04marks)

(e) What conclusion can you draw from the results in a mixed stand. (04marks)

(f) What other factors are likely to have caused the difference in growth rate of the two species in mixed stand? (03marks)

SECTION B (60MARKS)

2 a) Describe how the loop of Henle operates as a counter-current multiplier. (08marks)

b) Explain how different animals have solved their osmotic challenges. (12marks)

3 a) How does variation in osmotic pressure in the soil surrounding the root hair cells affect mechanical support? (10marks)

b) Explain how plant hormones are transported. (10marks)

4 a) Describe how abnormal hemoglobin arises in the human population. (9 marks)

b) Explain:

(i) the effect of the gene for abnormal heamoglobin in the human population. (07 marks)

(ii) why people with the sickle cell trait do not suffer from malaria. (05 marks)

5 a) Describe the events that lead to perception of a clear image from a far object by humans during a bright day. (10marks)

b) Discuss the significance of coordinating systems in animals. (10marks)

6 a) Compare the structure and functioning of the cardiac and skeletal muscles (10marks)

b) Explain how structural features of birds are related to flight (10marks)

END

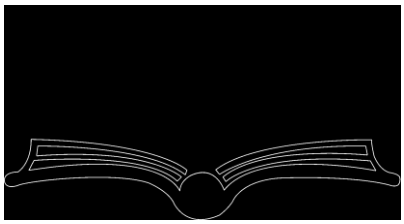
P530/2

BIOLOGY

Paper 2

August

2½ Hours



ELITE EXAMINATION BUREAU MOCK 2016

Uganda Advanced Certificate of Education

BIOLOGY

(Theory)

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of sections **A** *and* **B.**

Answer question **one** *from section* **A,** *plus* **three** *questions from section* ***B****.*

Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically, illustrating with well labelled diagrams where necessary.

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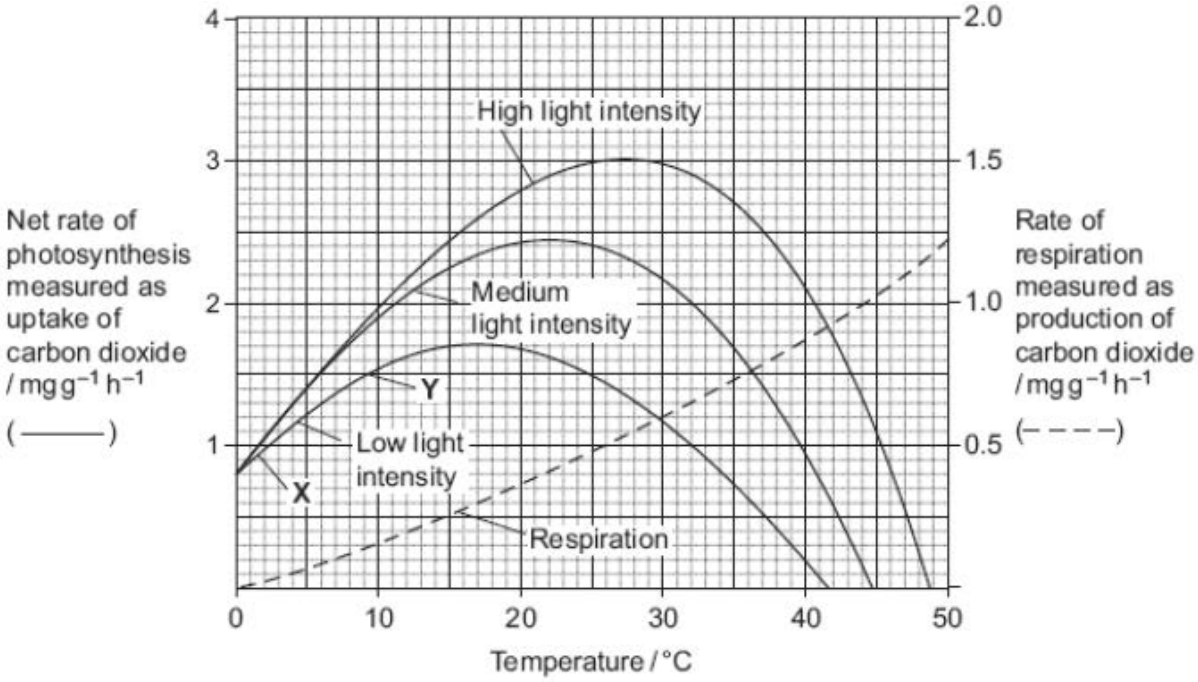
SECTION A (40 MARKS)

Scientists investigated the effects of temperature and light intensity on the rate of photosynthesis in creeping azalea plant. They investigated the effect of temperature on the **net rate** of photosynthesis at three different light intensities. They also investigated the effect of temperature on the rate of respiration. **Figure 1** shows the results.

Figure 1



(a) Explain the factors that limited the rate of photosynthesis from point marked X to Y. (06 Marks)

(b) Comment on the photosynthetic efficiency of azalea plant at different light intensities. (06 Marks)

(c) Compare respiration and photosynthesis at high light intensity. (07 Marks)

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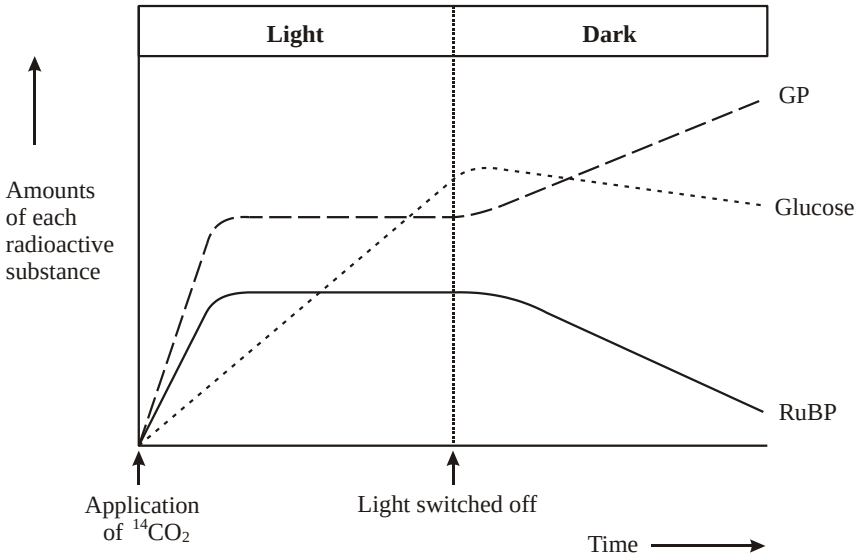
(d) Explain the trend in the rate of respiration as shown in the graph.

(05 Marks)

Figure 2 shows the results of an experiment in which photosynthesising cells were kept in the light and then in darkness.

Figure 2



(e) Explain the effect of varying illumination cycles on the amounts of each radioactive substance. (16 Marks)

SECTION B (60 MARKS)

2. (a) Describe the structure of nucleic acids. (06 Marks)

(b) Compare the processes of eukaryotic DNA replication and transcription. (06 marks)

(c) Explain how meiosis can result in an almost infinite genetic variety. (08 marks)

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3. (a) Explain the reactions that occur in the matrix of the mitochondrion that are part of aerobic respiration. (10 marks)

(b) Describe how carbon dioxide from tissues is expelled in gaseous form by the lungs. (10 marks)

4. (a) Explain the modern theory of evolution by natural selection. (10 marks)

(b) How does each of the following affect gene frequency within a population?

(i) Non-random mating. (03 marks)

(ii) Disruptive selection. (03 marks)

(iii) Mutation. (04 marks)

5. (a) Distinguish between **negative** and **positive** feedback loops. (04 Marks)

(b) Explain how feedback mechanisms regulate each of the following:

(i) The menstrual cycle in a non-pregnant human female (08 Marks)

(ii) Blood glucose levels in humans. (08 Marks)

6. (a) Describe the functioning of Golgi apparatus in animal cells. (14 Marks)

(b) Explain the role of lysosomes in animal cells. (06 Marks)

END.

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P530/2
Biology
Paper 2
June/July 2016
2½ Hours

ACEITEKA JOINT MOCK EXAMINATIONS 2016

UGANDA ADVANCED CERTIFICATE OF EDUCATION

BIOLOGY PAPER 2

(Theory)

2 Hours 30 Minutes

Instructions to candidates:

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

*Answer question one in **Section A** plus three others from **Section B***

Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically, illustrating with well labeled diagrams wherever necessary.

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SECTION A (40 MARKS)

1. The relationship between potassium ion concentration in the roots and sugar consumption at different oxygen percentage was investigated. The table below shows in (mg cm^{-3}) the concentration of potassium ions and the rate of sugar consumption (mg hr^{-1}) by roots of fleshy uprooted plants when inserted in a bathing fluid, at different oxygen concentrations.

Oxygen concentration (%)	0	2	5	10	20	30	50	70
Potassium ion concentration ($Mgcm^{-3}$)	7	10	21	49	52	51	48	44
Rate of sugar consumption ($Mghr^{-1}$)	14	16	20	27	33	34	35	36

a) Plot the results in the table graphically, so that you can easily interpret the data. (11 marks)

b) From the graph, state the differences and similarities of the effect of Oxygen percentage on the potassium ion concentration in the roots and rate of sugar consumption.

i) Differences (2½ marks)

ii) Similarities (2½ marks)

c) Give an explanation for each of the following:

i) Potassium ions are present in the root even at Zero concentration of oxygen (3 marks).

ii) Potassium ion concentration increases rapidly with increasing oxygen concentration up to 20%. (3 marks)

iii) The Potassium ion concentration begins to fall off after the peak at oxygen concentration of 20% .(3 marks)

iv) The rate of sugar consumption continues with increase in oxygen concentration throughout the range shown. (4 marks)

d) i) State other factors other than oxygen concentration that affect the rate of potassium ion uptake by roots. (3 marks)

ii) Briefly explain the uptake of minerals from the soil up to the leaf mesophyll cells of the plant

(8 marks)

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SECTION B (60 MARKS)

*Answer any **three** questions from this section.*

Additional questions answered will not be marked

2. a) What is meant by annual rings? (5marks)

b) Describe the secondary growth changes under gone by phellogen in plants. (7marks)

c) Explain the metamorphic changes in amphibians. (8 marks)

3. a) (i) How do the different forms of gene interactions differ? (1 mark)

(ii) Describe the different forms of epistasis using relevant examples in each case. (12 marks)

(b) (i) What are cross over values and why are they usually computed? (3marks)

(ii) Discuss the conditions that will lead to the emergence of polyploidys in a population

4. a) Discuss the functional properties of skeletal muscles (11 marks)

(b)Explain how the balance of the body is achieved in humans (9 marks)

5. (a) Describe the structure of an antibody (5marks)

(b) Describe the human body immune response towards infection (15 marks)

6. a) Explain how the bird's wing behaves as an aerofoil. (7 marks)

b) What is meant by synchronous and asynchronous flight muscles in insects? (4 marks)

c) Briefly explain how support is achieved in dogfish. (9 marks)

End

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NAME: ……..... INDEX NO. ……..

SCHOOL: ……. SIGNATURE: ……..

P530/2
BIOLOGY THEORY
PAPER 2
JULY/AUGUST, 2017
2 Hours 30 Minutes.

RESOURCEFUL MOCK EXAMINATIONS, 2017

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS, 2017

BIOLOGY THEORY
PAPER 2
2 Hours 30 Minutes

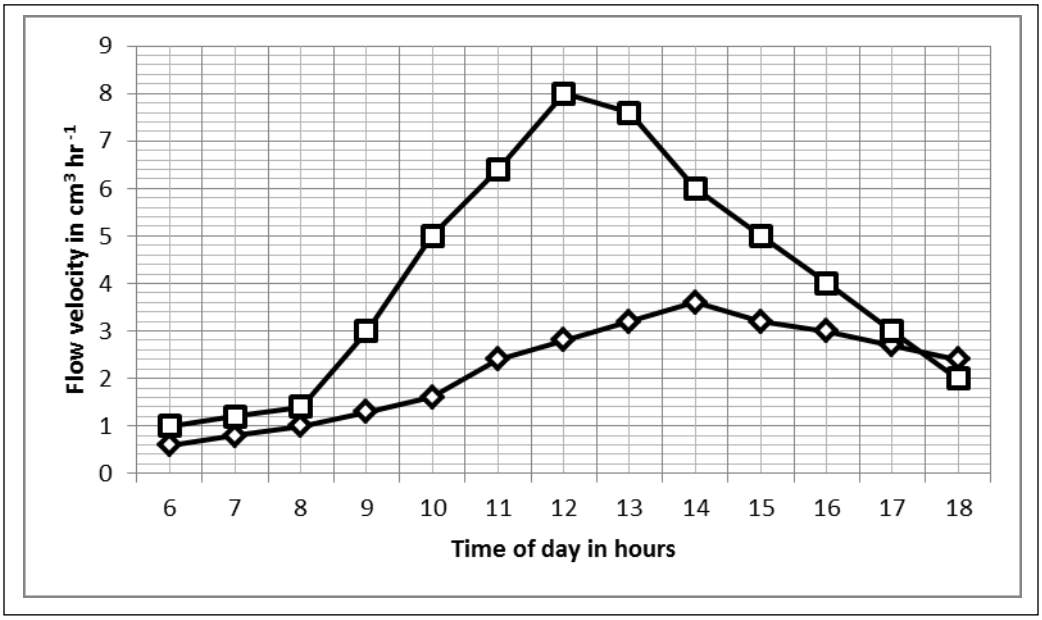
INSTRUCTIONS TO CANDIDATES.

- *Attempt four numbers in this paper only*
- *Section A is Compulsory*
- *In Section B attempt only 3 numbers*
- *If necessary illustrate using diagrams*

FOR EXAMINERS' USE ONLY		
SECTION	**Marks**	**Examiner**
I		
II		
II		
Total		

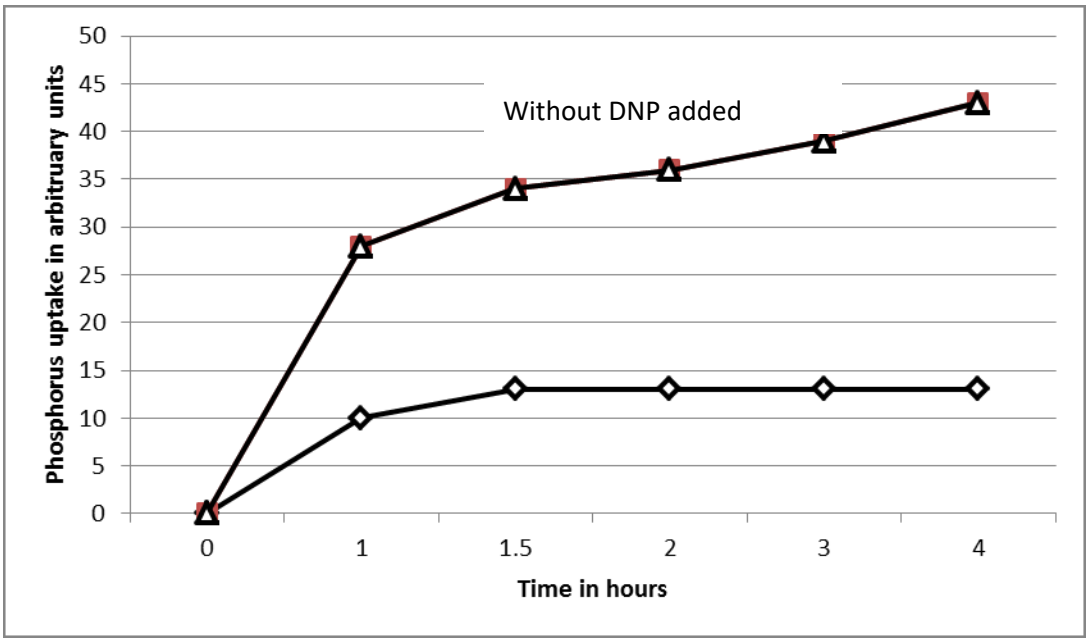
SECTION A (40 MKS)

1. i) An experiment was carried out to investigate the linear velocity of flow of sap through the xylem in the trunk and in one of the small branches at the top of a tree in a savannah grass land.
The figure 1 below shows the results of the experiment plotted on a graph.



a) Compare the linear velocity of flow of sap through the xylem in the trunk and in one of the small branches. (8mks)
b) Explain the difference in linear velocity of flow in the circumference of the trunk measured at 1400hrs when compared with that measured at 1800hrs. (3mks)
c) What conclusion can you draw about the mechanism by which water passes up the tree using these results. (1mk)
d) Explain the properties of water that account for its movement from roots to leaves of very tall plants or trees. (6mks)

ii) Figure 2 below shows effect of Dinitrophenol (DNP) on the uptake of phosphorus by slices of carrot at the same temperature.



a) Describe the uptake of phosphorus without addition of DNP. (3mks)
b) What can be deducted from these results with respect to the process of phosphorus uptake by the tree? (6mks)

c) Suggest one condition other than inhibitors which might produce an effect similar to the one on the lower graph with DNP in figure 2 above. (2mks)

d) In an experiment similar to that described above in (b) but involving phosphate uptake, 16% of the phosphate taken up by barley roots over a short period could be washed out after transferring to pure water again, explain? (3mks)

e) Describe how ions reach the xylem from the soil. (7mks)

SECTION B (60 MKS)

2. A) Describe the trend of succession in a terrestrial ecosystem. (10mks)
   b) Explain the human activities that interfere with nutrient recycling and energy flow in a terrestrial ecosystem. (10mks)

3. a) What is meant by phytochromes? (5mks)
   b) Describe the control of flowering in tobacco by phytochromes. (7mks)

c) Describe phototropism in plants. (8mk)

4. a) Describe the structure of the mammalian placenta (5mks)
b) Explain the functions of the mammalian placenta as a barrier. (5mks)
c) Explain the series of events that will take place immediately after fertilization which leads to formation of a placenta. (10mks)

5. a) What is an aerofoil? (2mks)
b) Describe a birds wing as an aerofoil. (8mks)
c) Explain how locomotion is achieved in bipedal mammals. (10mks)

6. a) Define the term "cell organelle" (2mks)
b) Explain how ATP molecules can be formed using protons (hydrogen ions) or hydrogen atoms in different organelles within the plant cells. (12mks)
c) How are the different types of plants adapted to obtain maximum sunlight? (6mks)

END