

**UNEB 2023 BIOLOGY THEORY PAPER ONE**  
**QUESTIONS WITH ANSWERS (ALL ANSWERS HAVE**  
**REFERENCES TO JUST ONE BIOLOGY TEXTBOOK-**  
**Comprehensive Introduction to Biology aka CIB**  
**TEXTBOOKS)**

**SECTION B**

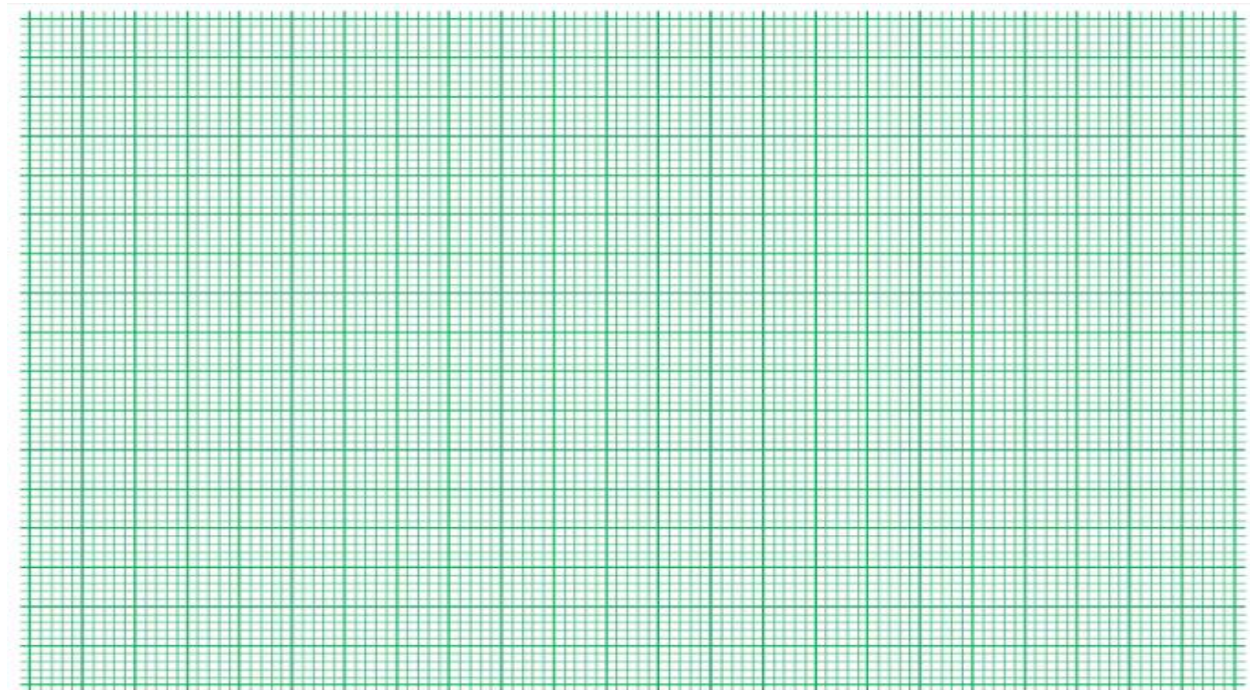
31. An experiment was carried out to investigate the rate of drainage of two soil samples **X** and **Y**.

Equal volumes of soil samples X and Y were placed in separate funnels fitted with cotton wool. Equal amounts of water were then added to the funnels.

The volume of the filtrate was recorded at given intervals as shown in the table below.

Time in minutes	Volume of filtrate collected (cm <sup>3</sup> )	
	Soil X	Soil Y
0	0	0
2	9	1
4	12	2
8	15.9	3.6
12	16	4.8
14	16	5.4

(a) On the same axes, plot graphs to represent the information in the table above. (07 marks)



(b) Use your graphs to determine the volume of water that drained through each of the soil samples X and Y after 10 minutes. (2 marks)

Soil sample X.....

Soil sample Y.....

(c) (i) Describe the trend of the graph for soil sample X. (03 marks)

.....  
 .....  
 .....  
 .....

(ii) Explain the trend of the graph of soil sample X. (03 marks)

.....  
 .....  
 .....  
 .....

(d) Explain the trend of the graph of soil sample Y. (03 marks)

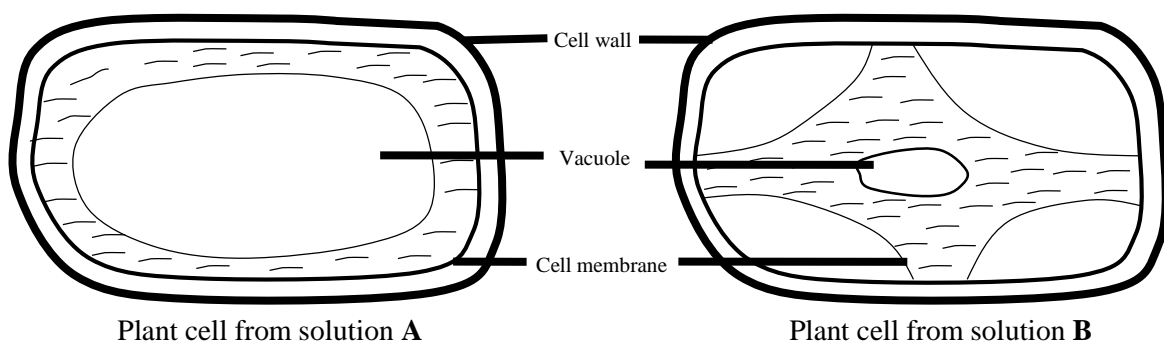
.....  
 .....  
 .....  
 .....

(e) Giving a reason, identify the soil sample that contains more air to support living organisms. (02 marks)

Soil sample.....

Reason.....

32. Two plant cells were obtained from the same plant. One plant cell was placed in solution **A** while the other plant cell was placed in solution **B**. Solutions **A** and **B** were of different concentrations. The plant cells were then observed under a light microscope and their appearance was as shown in the illustration below.



(a) State the condition of the plant cell from solution B (01 mark)

**C I B S.2 page 166** (Plasmolysed cell)

(b) State the nature of the solutions in which each of the plant cells were placed. (02 marks)

(i) Nature of solution A. **Hypotonic solution C I B S.2 page 163** (When the concentration of solute molecules outside the cell is lower than the concentration in the cell's cytoplasm, then the solution outside the cell is called hypotonic solution (hypo means 'less solutes'). In this situation, water simple diffuses into the cell.

(ii) Nature of solution B. **Hypertonic solution C I B S.2 page 163** (When the concentration of solute molecules outside the cell is higher than the concentration in the cytoplasm of the cells, then the solution outside the cell is called hypertonic solution (hyper means 'more solutes'). In this situation, water undergoes simple diffusion out of the cell's cytoplasm.

(c) (i) Describe how the observed changes occurred in plant cell from solution B. (04 marks)

**C I B page 166** (if you transferred a non-saline soil plant i.e. plant not adapted to saline soils (soils with excess salts) to grow along the shores of oceans or salty lakes that have saline soils, then their roots will be surrounded by a hypertonic solution. This will cause the water to leave the plant cells by osmosis to the saline soils. The movement of water out of the plant cells will cause the cell membrane to shrink away from the cell walls leading to loss of turgor pressure and so the leaves droop.)

(ii) State two reasons why the condition of plant cell from solution A is important to the plant. (02 marks)

**C I B page 165** (Absorption of water from the soil: The root hair cell of plants absorbs water from the soil through osmosis.

Osmosis also helps in distribution and movement of water from the roots to other parts of the plant.)

(d) State what would happen if an animal cell was placed in a solution A. (01 mark)

**C I B page 167** (Since the animal cell does not have a cell wall to resist further intake of water and no osmoregulatory process, it will swell till it burst unless removed and transferred to a tolerable solution. Please know that...the bursting of animal cells due to continued osmosis is called cytolysis.)

33. (a) State the type of skeleton possessed by humans. (01 mark)

**C I B S.3 page 138** (The **Endoskeleton**: These are the skeletons in humans we have been describing in light details as required at this level of education. You can define those (endoskeletons) as skeletons that form internal frame work within an organism.)

(b) In the table below, name two parts of the human skeleton and the body organ each protects. (04 marks)

Part of the human skeleton	Name of body organ protected
(i) skull	brain
(ii) vertebrae	spinal cord

**C I B S.3 page 138** (They protect delicate organs such as brain by skull, spinal cord by vertebrae, lungs and heart by the ribs etc.)

(c) Other than protection, outline three functions of the human skeleton. (03 marks)

**C I B S.3 page 138** (They give body its shape. They are used in locomotion since bones serve as levers. Red blood cells are formed in bone marrows.)

(d) Other bones, state one other structure of a joint giving its function. (02 marks)

**Structure:** Synovial membrane

**Function:** Secretes synovial fluid

**C I B S.3 page 139** (The outer part of the synovial joint is the joint capsule which is made of dense connective tissue. Inside the capsule is the synovial membrane which secretes synovial fluid, a lubricating liquid that reduces friction inside the joint. The space inside the cavity is called synovial cavity. Each bone in a joint attaches onto the hyaline cartilage cap called the articular cartilage.)

### SECTION C

*Attempt any two questions from this section*

34. (a) Explain why animals are able to respond to stimuli very fast while plants respond slowly. (02 marks)

**C I B S.3 page 74** (Messages are sent in the form of electrical messages. Messages are sent in the form of organic message.)

(b) Explain the difference between simple reflex and conditioned reflex giving an example in each case. (04 marks)

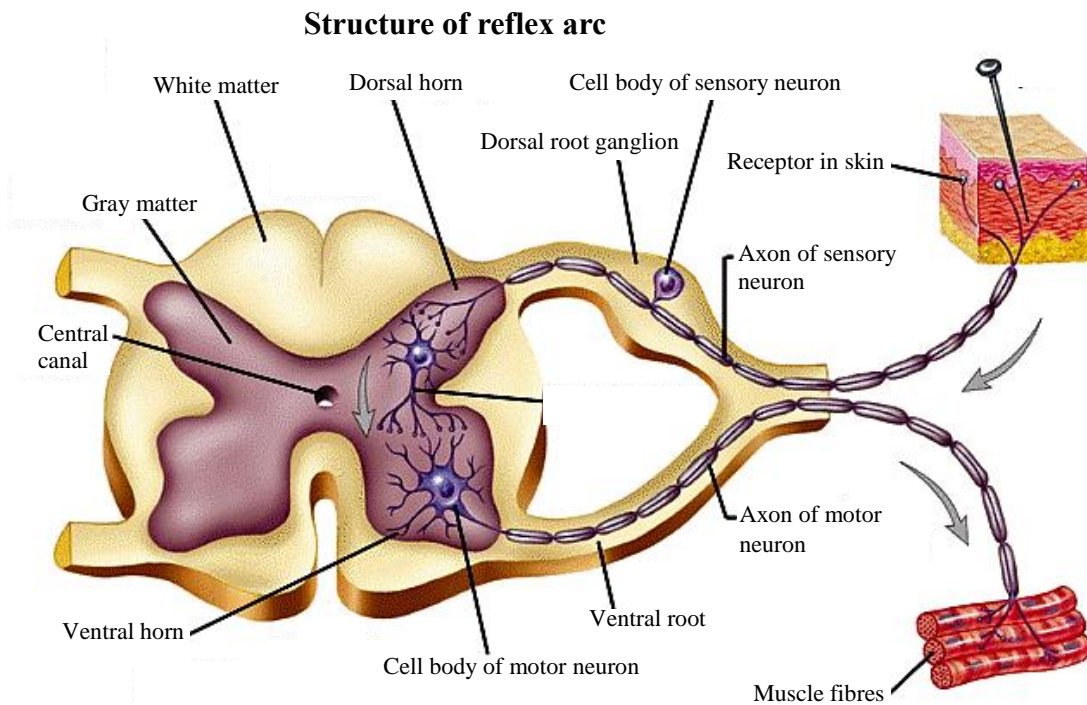
**C I B S.3 page 35 and 37** (Examples of irritabilities include; reflex action (simple reflex action), conditioned reflexes and voluntary actions. **PAGE 35**). Reflex action is an automatic and very fast response by animals to stimulus which occurs without the animal's consciousness. The response to such stimulus involves the spinal cord only and all of them tend to make the animal move away from the stimulus very fast. Examples of reflex action include; blinking of the eye, the knee jerk, withdrawal of hand or foot from hot or very sharp objects, swallowing food, salivating for food, ejaculation of .....**PAGE 35**.

Conditioned reflexes are learnt forms of behaviours and like simple reflexes are also automatic. They are acquired through habit or practice unlike the simple reflex which is not learned. Examples of conditioned reflexes are: Balancing on one leg, automatic balancing on a bicycle, walking, responding to school bell, taking cover on the sound of gun fire, immediate understanding of a signal, advert etc. **PAGE 37**

(c) With the aid of a diagram, describe the path of a simple reflex arc. (09 marks)

**C I B S.3 page 35**. The path followed by the impulses that bring about reflex action is called a reflex arc e.g. when one is pricked by a sharp object such as a pin or a very hot object. *See the illustration below.*

The stimulus is the heat of the object or the prick of the pin. This is detected by temperature receptors in the skin which send impulses through a sensory neuron to the spinal cord.



From here they are transmitted through an intermediate neuron to a motor neuron and then to the effectors which in this case are the muscles of the arm. These contracts and one withdraws the arm from the hot object. All these adjustments occur in less than a second and serve to protect the hand from the hot objects.

35. (a) Define a **parasite** and give an example. (02 marks)

**C I B S.4 page 171** (A parasite is therefore a living organism which establishes itself either on the surface or inside the body of a host, which must be much bigger, stronger and of different species from the parasite. A host is an organism inflicted with some harm due to its association with a parasite. Parasites such as aphids, lice, leeches, bedbugs, fleas, ticks, and mosquitoes that remain on the outside of their host are called ecto-parasites.)

(b) How are parasites adapted for their mode of life? (10 marks)

**C I B S.4 page 172** (Development of highly specialized mouth parts especially the liquid feeders such as mosquitoes, aphids, ticks, bedbugs, hookworms. Possession of claws for attachment. Development of penetrating devices for access into the tissues of the host. For example *Phytophthora infestans* have penetrating haustoria. Developments of structures for attachments such as succus and hooks in

hookworms, succus in leeches, floss in biting lice etc. Development of thick resistant outer covering in some parasites like most of the endo-parasites such as tapeworms, liver fluke and ascaris.

Loss of unwanted organs such as eyes in most endo-parasites since the parasite lives in the constant darkness of the inside of their host. Some have developed a rapid means of escape like the flea. Most parasites produce exo-enzymes which digest the tissue of the host external to the parasite. Example is the fungi and plasmodium. Production of anticoagulants by blood feeding parasitic animals like mosquitoes, bedbugs' etc. High sensitivity to chemicals produced by host, hence aiding them (parasites) to find their host. Production of anti-enzymes by especially the gut parasites like the roundworms, tapeworm. Possession of resistant cuticle by the gut parasites to the enzyme of the host, so as to avoid being digested. Ability to respire anaerobically in very low oxygen concentration like in the stomach or intestines.)

(c) Give **three** control measures for **endoparasites**. (03 marks)

**C I B S.4 page 174** (Ensure good personal hygiene and eating habits. Improved sanitation and hygiene would cut the risk of infection. Keep hands always clean. Trim nails. Wash hands before eating or preparing food. Wash hands after a toilet visit. Any anti-bacterial soap will usually ensure a worm-free existence.)

36. (a) What is **meiosis**? (03 marks)

**C I B S.3 page 172** (Or...Meiosis is nuclear division that leads to a halving of chromosome number during the production of sperm and egg.)

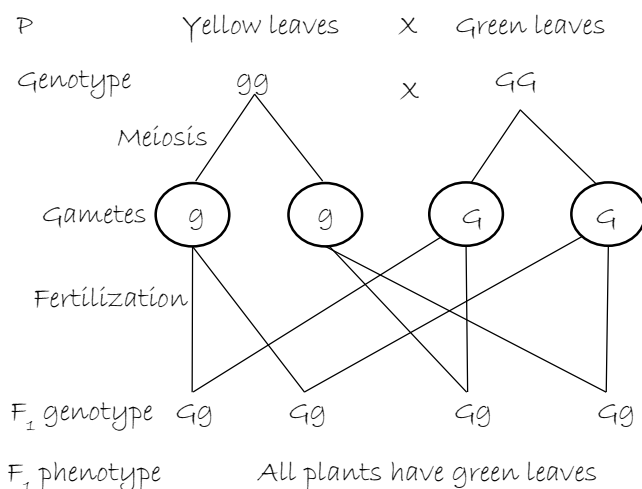
(b) In a breeding experiment, a plant with yellow leaves was crossed with a plant with green leaves and all the **F<sub>1</sub>** generation had green leaves.

Using genetic symbols, show how the results in **F<sub>1</sub>** generation were obtained. (05 marks)

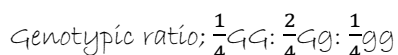
**C I B S.3 page 185**

Let **G** represent the allele for .....green leaves

Let **g** represent the allele for .....yellow leaves



(i) Using genetic symbols, show how the results in  $F_2$  generation were obtained. (04 marks)



**$\frac{3}{4} \times 85 = 63.75$  i. e. 64 plants with green leaves were obtained**

**C I B S.2 page 9** (As plants carry out the process of photosynthesis, factors such as light intensity, carbon dioxide concentration, temperature, water and chlorophyll determine the rate at which it proceeds.)



(c) How are leaves of green leaves suited for photosynthesis? (10 marks)

**C I B S.2 page 3** (Mosaic arrangement is when the leaves arrange themselves in a mosaic pattern i.e. in a way that leaves minimize overlapping one another so as to reduce the degree of shading on one another. Leaves have large surface area to receive as much light as possible. Leaves are held at an angle perpendicular to the sun's rays during which they ensure maximum light absorption. Leaves are thin. If they were thicker, the upper layers would filter out all the light and the lower layers would not photosynthesize. The cuticle and epidermis are transparent to allow light through to the photosynthetic mesophyll below.

The palisade mesophyll cells are packed with chloroplasts which trap maximum light. The chloroplasts within the mesophyll cells can move. These allow them to arrange themselves in the best position within the best location within the cells for the efficient absorption of light. The leaves of some plants like those of beans position their leaves horizontally in the morning hours and late evening hours so that plenty of light falls on the leaves but position their leaves almost vertically to avoid the very high temperatures at mid-day throughout the afternoon to reduce rate of water loss through transpiration.

a large central midrib which is possessed by most dicotyledonous leaves. The midrib contains a large vascular bundle comprising of xylem and phloem tissues which can carry out their roles of transportation to aid photosynthesis. A network of small veins which are found throughout the leaves. These ensure that no cell is far from the xylem or phloem vessels and therefore all cells have a great supply of water for photosynthesis and the means of removing the sugars they produced.)

**All the text in the brackets are the exact contents extracted from referenced pages in C I B TEXTBOOKS that provided the answers to all the questions set by UNEB 2023 in Biology paper one.**

**NO ANY OTHER BIOLOGY  
TEXTBOOKS IN THE WORLD  
HAVE GOT SUCH CAPABILITY**