

Aga Khan University Examination Board
Notes from E-Marking Centre on HSSC I Biology Examination May 2015

Introduction

This document has been produced for the teachers and candidates of HSSC Part I (Class XI) Biology. It contains comments on candidates' responses to the 2015 Higher Secondary School Certificate (HSSC-I) Examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

E-Marking Notes

This includes overall comments on students' performance on every question and some specific examples of students' responses which support the mentioned comments. Please note that the descriptive comments represent an overall perception of the better and weaker responses as gathered from the e-marking session. However, the candidates' responses shared in this document represent some specific example(s) of the mentioned comments.

Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that requires candidates to respond by integrating knowledge, understanding and application skills they have developed during the course of study. Candidates are advised to read and comprehend each question carefully before writing the response to fulfil the demand of the question.

Candidates need to be aware that the marks allocated to the questions are related to the answer space provided on the examination paper as a guide to the length of the required response. A longer response will not in itself lead to higher marks. Candidates need to be familiar with the command words in the Student Learning Outcomes which contain terms commonly used in examination questions. However, candidates should also be aware that not all questions will start with or contain one of the command words. Words such as 'how', 'why' or 'what' may also be used.

Detailed Comments:

Question 1a

Describe TWO examples of the use of bioremediation in cleaning the environment.

Better responses wrote relevant examples of use of living organisms for bioremediation. Most of the responses wrote about the role of microorganisms in cleaning up oil spills. Some of them wrote that algae are used to reduce pollution of heavy metals by bioabsorption or microorganism/ bacteria/ fungi/ decomposers are used to clean environment.

Example:

1) The bacteria who are the decomposers they take nutrition from soil by ~~cont~~ organic compounds which are present in the soil they clean the environment.

2) The saprophytic fungi take nutrition from the decomposers because they absorb nutrition from death animal, plant, & microorganisms found in the environment.

Weaker responses described the process of bioremediation instead of examples or gave irrelevant examples of recycling such as paper is recycled to make decorative items. Some responses wrote about role of microorganisms in drugs/ antibiotics manufacturing. Few of the responses stated some preventive measures to avoid pollution.

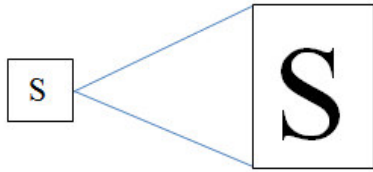
Example:

1. Many industries use the technique of bioremediation to recycle the paper, polythene bags and other waste material to clean up the environment. Fertilizers are used to kill pests ^{that} grows on crops.

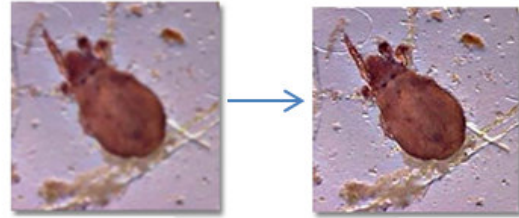
2. Lichens are used as pollution indicator. In this way, biologists use different beneficial chemicals to filter the air and remove the toxic pollutants. Similarly, ^{chemical like chlorine} ~~bioremediation~~ clean the lakes, ponds and seas.

Question 1b

The diagrams show two features of the microscope. Identify these features.



Feature I: _____



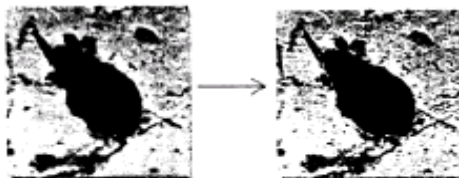
Feature II: _____

Better responses correctly identified the features of the microscope shown in the diagram, i.e. feature I: Magnification and feature II: Resolution.

Example:



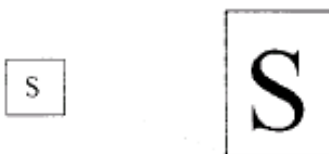
Feature I: Magnification



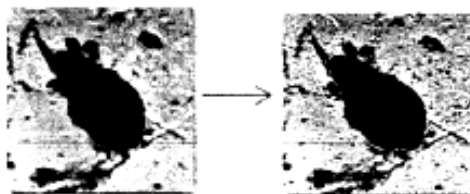
Feature II: Resolution

Weaker responses identified feature I as substrate/ convex lens/ cover slip whereas feature II as dinoflagellate/ focus/ frog/ chlamydomonas. Some of the responses interchanged the features and thus were awarded zero. In a few cases it was observed that candidates used synonyms like enlargement/ increasing size or clearer. Teachers should emphasise on the use of scientific terminologies in class and discourage generalisation.

Example:



Feature I: Resolution



Feature II: Magnifying

Question 2a

Complete the given table to compare the classification system of Robert Whittaker with that of Margulis and Schwartz.

	Robert Whittaker's Classification System	Margulis and Schwartz Classification System
Similarity		
Difference		

Better responses, as a similarity, wrote that both classification systems divided organisms into five kingdoms, i.e. monera, protista, fungi, plantae and animalia. Differentiating both classification systems, such responses wrote that Robert Whittaker classified living organisms on the basis of levels of cellular organization and modes of nutrition or he placed unicellular algae in Protista and multicellular algae in plantae whereas Margulis and Schwartz, in addition to Whittaker's classification system, considered cytology, genetics and organelles of symbiotic origin (mitochondria and chloroplast) as well for the classification of living organisms or they placed unicellular and multicellular algae in protista and named it as protocista.

Example:

	Robert Whittaker's Classification System	Margulis and Schwartz Classification System
Similarity	In these 2 classification system there were five Kingdoms. Monera (prokaryotes), Protist, Fungi, Animalia and plantae. (eukaryotes) (reducers), (heterotrophic), (autotrophic).	
Difference	It was based on 3 modes of nutrition: photosynthesis, ingestion, absorption	It was basically the modification which was based on: cytology, genetics, modes of nutrition, cellular organization etc.

Weaker responses stated that in both classification systems all organisms are classified according to cell or both systems put eukaryotic animals into kingdom animalia and eukaryotic plants into kingdom plantae. Few of them highlighted complexity of cells as a similarity. Some of them mentioned that both classification systems put multicellular heterotrophs in kingdom animalia or both classified living organisms on the basis of prokaryotes and eukaryotes.

In case of differences, weaker responses wrote that Whittaker classified living organisms on the basis of mode of reproduction, respiration and ingestion whereas Margulis classified according to cellularity, ingestion and reproduction. Some of them highlighted five classes in Whittaker's classification system and two major classes in Margulis classification system or Whittaker's gave the concept of three kingdom system whereas Margulis of five kingdom system.

Example:

	Robert Whittaker's Classification System	Margulis and Schwartz Classification System
Similarity	All organisms are classified a/c to the cellularity. Cell is the basic unit of life composed in all organisms (prokaryotes or eukaryotes).	
Difference	Classify organisms a/c to mode of reproduction, respiration, ingestion.	Classify organisms a/c to their mode of ingestion, cellularity & reproduction.

Question 2b

According to the Polio Global Eradication Initiative website, 291 polio cases have been reported in Pakistan year-to-date 2014 with the most recent case on 04 December, 2014. Which preventive measures, if taken, can eradicate polio from the country?

Better responses wrote that polio can be eradicated from the country if children/ new born from the age of 2 months till 4 to 6 years (or up to 5 years) receive polio vaccine (oral or injected).

Example:

Preventive measures of polio is vaccination of polio. If every newborn is given polio vaccination so there are chances that after some time polio can be eradicated from country.

Weaker responses wrote that blood transfusion should be avoided or RNA structures of virus should be reduced/ finished or avoid sexual contact or sterilized instruments should be used. Few of them suggested surgical treatment or bioremediation. It was observed that candidates failed to understand the difference between prevention and treatment.

Example:

polio can be eradicated from the country by reducing and finishing the polio viruses which cause polio and is RNA enveloped virus. and by disturbing its RNA's structure.

Question 3a

A mineral water company takes water from hot springs, boils it to 100°C and distributes it in the market for consumption. Name and define the type of bacteria that could still be present in the mineral water.

Better responses correctly identified the type bacteria, i.e. thermophilic/ heat-loving/ heat resistant bacteria which can tolerate high temperature.

Example:

Thermophilic bacteria could still be present in the mineral water.
because it is temperature resistant bacteria and could tolerate high temperature.

Weaker responses identified the bacteria as cocci/ streptococci/ *E. coli*/ bacilli/ aerobic/ anaerobic/ capsulated/ cyanobacteria.

Example:

Escherichia coli or *E. coli*.
It is ^a facultative bacteria which can survive in both aerobic (presence of oxygen) and anaerobic (absence of oxygen) conditions.

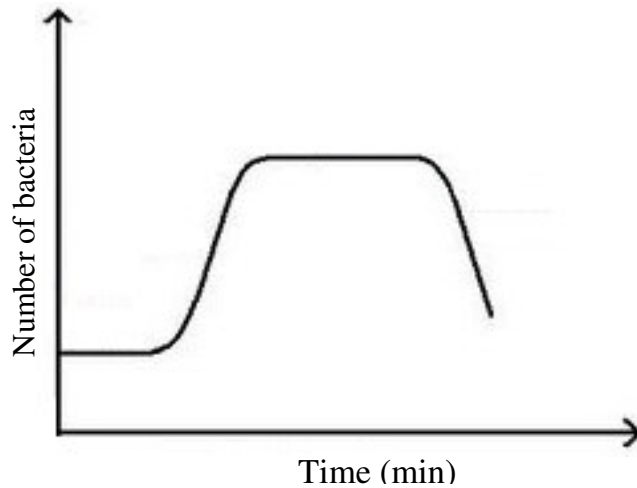
Question 3b

Following is the description of two of the phases of growth in bacteria.

Phase **X**: Rate of reproduction of bacterial cells becomes equal to their death rate.

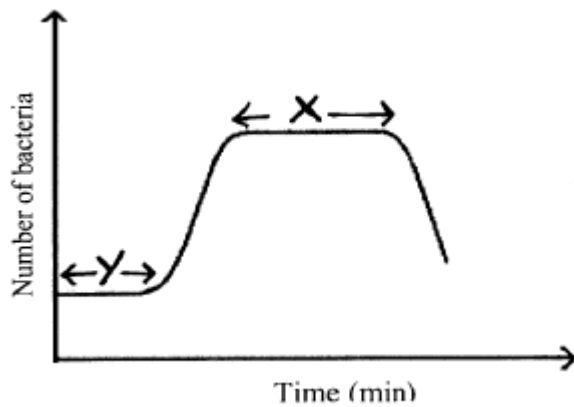
Phase **Y**: Cell growth without division.

Identify on the graph the positions of phases **X** and **Y**.



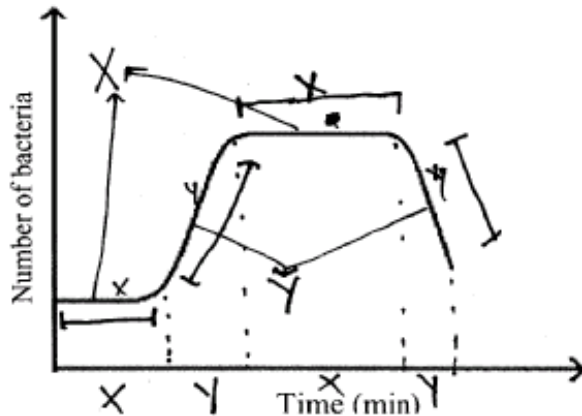
Better responses correctly identified the positions of phases **X** and **Y** on the graph.

Example:



Weaker responses either interchanged the identification of phases or identified decline phase as X or log phase as Y.

Example:



Question 4a

Name the group of protozoa that lives in shells. Describe how this contributes to the formation of limestone deposits in oceans.

Better responses identified the group of protozoa as foraminiferans/ actinopods. They also described that the dead foraminiferans sink to the bottom of oceans where their shells form grey mud that gradually transforms into limestone/ chalk deposits.

Example:

foraminiferans are the protozoans that have calcareous shell/test. They have beautiful geometrical patterns and pores in their test to capture prey. When they die, their shells sink to the bottom of the ocean, where they form limestone deposit after millions of years.

Weaker responses identified the group as brown algae/ zooplanktons/ dinoflagellates/ ciliates/ diatoms. Such responses described that the shells are made up of calcium and silicon or shells under favourable conditions deposit limestone.

Example:

Zooplankton and phytoplankton are the group of
protozoa that lives in shells. They secrete a
calcareous shells which deposit the lime stone
in ocean.

Question 4b

Highlight TWO distinguishing features of algae due to which it is not placed in kingdom plantae.

Better responses displayed a good understanding of the key terms used in the question and wrote only those characteristics which are distinguishing, such as algae have unicellular sex organs and the zygote of algae is not protected by the parent body.

Example:

The two distinguishing features are:
① Unlike plants which possess multicellular sex organs, algae contains
unicellular sex organs. ② The developing zygote in algae is not
protected inside female plant body as observed in plants.

Weaker responses wrote general characteristics of algae which are found in some plants as well. E.g. algae are aquatic, so is lotus/ hydrilla or algae are thalloid, so are bryophytes. Some of the responses gave vague descriptions like algae are prokaryotes whereas, plants are eukaryotes or algae lack cell wall but plants have cell wall. Candidates are advised to read the question carefully before attempting it in limited space. The question does not demand distinguishing features of plants rather it asks to highlight those two unique features of algae due to which it is not placed in kingdom plantae.

Example:

Algae are aquatic organism ~~and they~~ while the organism in kingdom plantae are terrestrial and subaerial. In algae, Heteromorphic alternation of generation is not present while in plants it is present.

Question 5a

Describe how sexual reproduction takes place in zygomycetes.

Better responses precisely wrote that the two opposing mating strains fuse (fusion of hyphae) forming zygospores. When zygospores germinate, meiosis takes place and haploid spores are produced.

Example:

Zygomycetes (e.g Rhizopus) :- The sexual reproduction takes place by the formation of zygospores. Two hyphae of different but compatible mating types come close, the fusion of cytoplasm takes place, followed by karyogamy which is followed by meiosis which results in haploid spore formation.

Weaker responses highlighted archegonia and antheridia as sexual reproductive organs in zygomycetes or described presence of zygospore in sporangium or presence of conidia. Some of them wrote that sexual reproduction in zygomycetes takes place through gamete formation. Few of the responses described the process of fusion of male and female gametes till zygote is formed.

Example:

In zygomycetes sexual reproduction takes place through spores called zygospores produce in ~~sac like stru~~ sporangium. Spores are then ~~de~~ dispersed through wind and in favorable condition develops/germinate in new ~~mycelium~~ ^{mycelium}.

Question 5b

What are lichens? How do they contribute to the process of ecological succession?

Better response not only described lichens as a mutualistic symbiotic association between fungi and algae but also highlighted their role in breaking of rocks and setting stage for other organisms during the course of ecological succession.

Example:

Lichens are mutualistic associations between fungal hyphae and algae. Lichens breaks the rocks on where they live, setting stage for ecological succession.
thus

Weaker responses failed to write the contribution of lichens in ecological succession. Some of the responses described lichens as indicators of air pollution/ bio-indicators. Few responses described the mycorrhizal associations or role of fungi as decomposers.

Example:

Lichens are organism a Fungi which posses symbiotic relations with many ~~bi~~ big plants. These lichens change their colour in ^{presence} air pollution which can indicate the people to ^{control} ~~stop~~ pollution.

Question 6a

The diagram shows a parasite of phylum platyhelminthes.



Name the primary and intermediate hosts of this parasite.

Better responses correctly identified the primary and intermediate host of the given parasite, i.e. human and cattle respectively.

Example:

Primary Host:- Man (Intestine)

Intermediate Host:- Cow (Voluntary muscles)

Weaker responses either interchanged the host or identified wrongly, e.g. water/ small insects/ tapeworm as primary host and human as intermediate host.

Example:

cow, sheeps are primary host of flatworm while

human is intermediat hosts of this .

Question 6b

State any THREE ways in which this organism has adapted to the parasitic way of life.

Better responses wrote the ways in which tapeworm is adapted to the parasitic way of life such as body is covered by a resistant cuticle/ sucker and hooks are present for firm attachment/ nervous and muscular systems are degenerated/ digestive system is simplified/ life cycle is complex due to living in more than one host/ ova are produced in huge numbers/ capable of anaerobic respiration.

Example:

- ① Epidermis is absent. Presence of cuticle for protection.
- ② Digestive system is simplified due to increased dependence on host for nutrition.
- ③ Formation of Adhesive organs e.g:- suckers and hooks, which serve as a mean of attachment to host.

Weaker responses wrote irrelevant features of tapeworms, e.g. they get food when they enter inside the host/ have flat body which can easily enter the host cell/ they are capable of fragmentation/ can survive at optimum temperature and pH/ can collect food from environment and decompose their food. Candidates are advised to understand the demand of the question before drafting their responses. In the question, if parasitic adaptations are asked, they should not write general characteristics of the organism.

Example:

- 1 It has small structural shape it can be enter into any host.
- 2 It can move again again towards host if it enter it can generate move and more species.
- 3 It has fragmentation mode of reproduction any part of its body while its small fragment or tail or head it easily developed from them.

Question 7a

Why are dark reactions of photosynthesis named so?

Better responses gave very precise reason that these reactions do not require light directly and can occur in the presence or absence of light.

Example:

These are named dark reactions because they don't use light directly but use the products of light reactions.

Weaker responses gave reasons such as because it produces carbon dioxide/ carbon dioxide fixation takes place in this process/ in dark chlorophyll cannot react/ in this process chromosomes can react with stored energy.

Example:

Because in dark reaction the product oxygen in photosynthesis and product Carbondioxide in respiration become equal.

Question 7b

Fill in the given table with a part of gastrointestinal tract related to each pH. Also state the role of pH in the process of enzymatic digestion in each part.

pH	Name of the Part of Gastrointestinal Tract	Role of pH in Enzymatic Digestion
High (around 8)		
Low (around 2)		

Better responses identified the part with high pH as small intestine and with low pH as stomach. These responses also described the role of pH in enzymatic digestion in both parts using **named** enzymes. Such responses wrote that the wall of small intestine produces intestinal juice into duodenum and ileum making the environment alkaline. It is important for the conversion/ activation of trypsinogen into trypsin which digests proteins into polypeptides. For stomach they wrote that the parietal cells of stomach wall secrete HCl which lowers the pH of stomach. This acidic environment of stomach is important for the activation of pepsinogen into pepsin which digests proteins into peptones and then into polypeptides.

Example:

pH	Name of the Part of Gastrointestinal Tract	Role of pH in Enzymatic Digestion
High (around 8)	Small Intestine.	An enzyme called Trypsin is present that works best in alkaline medium to digest proteins. Other bicarbonates and salts also require alkaline medium.
Low (around 2)	Stomach.	Pepsinogen is present that is converted into pepsin that works in acidic medium to convert proteins into polypeptides. HCl is also present that maintains the pH of stomach.

Weaker responses identified the part with high pH as stomach/ pancreas/ gastric glands/ oxygen/ large intestine and the part with low pH as small intestine/ liver/ pancreatic glands. Some responses wrote generalised function of pH that it maintains acidic and basic nature of enzymes without correlating it with the part of gastrointestinal tract given in the question. Others wrote irrelevant descriptions such as pancreas secretes pancreatic juice like spleen to maintain blood pH or enzymes digest the substance at high pH fast or liver produces bile juice which helps in the digestion of foods or the enzymes digest the substance at low pH slowly.

Example:

pH	Name of the Part of Gastrointestinal Tract	Role of pH in Enzymatic Digestion
High (around 8)	Stomach (gastric juices)	It maintains the acidic nature of enzyme and basic nature of enzyme.
Low (around 2)	Small intestine (villi)	It maintains the rate of reaction of enzymes

Question 8a

State ONE chemical change that takes place in each of the following during photorespiration in plants.

- i. Peroxisomes ii. Mitochondria

Better responses mentioned the precise chemical reaction taking place in peroxisomes and mitochondria, i.e. glycolate is converted into glycine and two glycine molecules are converted into serine and CO₂ respectively.

Example:

- i. Peroxisomes: Peroxisome convert glycolate into glycine.
- ii. Mitochondria: Mitochondria converts glycine into serine and CO₂.

Weaker responses wrote that in peroxisomes, carbon dioxide concentration decreases and in mitochondria, carbon dioxide concentration increases. Some of them wrote that in peroxisomes, RuBP is stored and released and in mitochondria, energy and serine is stored. Few responses also wrote that in peroxisomes, break down of hydrogen peroxide and fats takes place and in mitochondria, energy is stored in the form of ATP or Peroxisomes control transformation of chlorophyll for photosynthesis and mitochondria release carbon dioxide.

Example:

- i. Peroxisomes: There carbon concentration decrease during photorespiration in plants.
- ii. Mitochondria: There carbon concentration increase during photorespiration in plants.

Question 8b

List TWO fluids which keep the skin of the earthworm moist. How does the moist skin help the earthworm?

Better responses identified the correct fluids which keep the skin of the earthworm moist, i.e. mucus/ secretion of epidermal mucous gland cells and coelomic fluid. They also gave correct description of the function of the moist skin, i.e. in earthworm, exchange of gases takes place through skin; oxygen is dissolved on the wet surface, passes through the cuticle and epidermal cells to enter the blood or skin is richly supplied with blood capillaries.

Example:

Coelomic fluid and ~~mucus~~ mucus
Moist skin help the earthworm in the gaseous exchange of gases.
~~as it~~ Firstly the ~~oxygen~~ oxygen diffuses into the fluid and
then easily diffuses in the skin.

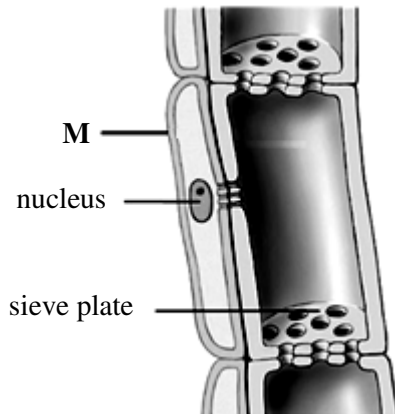
Weaker responses identified the fluids as pectin/ cellulose/ cuticle/ saliva. Most of the responses rephrased the information given in the question, i.e. moist skin helps earthworm to live in any conditions or moist skin helps earthworm in respiration and other surface activities. Few responses wrote that it helps earthworm to look fresh or protect their body from land problems or keep it cool and help in preying.

Example:

The Mucous is the best Fluid which Lubricates
the Skin of Earthworm, another Fluid is
also there named Lubricating Fluid. ~~as~~ These
Fluid help earthworm in their respiration
and other Surface Activities.

Question 9a

The diagram shows some specialized cells of a plant.



- i. Identify cell **M**.
- ii. Briefly describe how cell **M** is necessary for the functioning of the phloem.

Better responses identified cell M as companion cell. Such responses also described the role of companion cell that it helps in the translocation of food. It is more metabolically active than a typical plant cell/ contains numerous mitochondria and ribosomes. The cytoplasm of a companion cell is connected to the sieve-tube element by plasmodesmata through which sucrose is actively transported to phloem.

Example:

Companion cells .

Companion cells are necessary for the functioning of the phloem because they are connected with sieve tube elements with the help of plasmodesmata and help in the synthesis of ATP. Help the translocation of food from sink to source.

Weaker responses identified the cell M as connective cell/ cell wall/ epidermal cell/ cambium cell/ mesophyll cell/ xylem/ vessel tube. For the description of function of cell M they mentioned that it conducts water and material into phloem/ produces turgidity of cell/ provides water for hydrostatic pressure/ provides support to phloem/ prevent phloem from collapsing.

Example:

Connective cell.

It conducts the water along with the materials to get into the phloem. It stores water in it.

Question 9b

A doctor listening to the heart beat through a stethoscope hears two sounds as blood flows through the heart, lub and dub. How are these two sounds produced?

Better responses gave correct description of the sounds produced as *lub* and *dub*. They wrote that when ventricles contract to pump the blood to pulmonary arteries and aorta, the closure of bicuspid and tricuspid valves produces *lub* sound. When ventricles relax, at the same time semilunar valves at the base of pulmonary artery and aorta close simultaneously and *dub* sound is made.

Example:

During atrial systole blood flows from atria to ventricles via bicuspid and tricuspid valves. At the end of atrial systole both valve close producing "lubb" sound. Similarly at end of ventricular systole the semilunar valves close, once blood has passed through them, producing "dubb" sound.

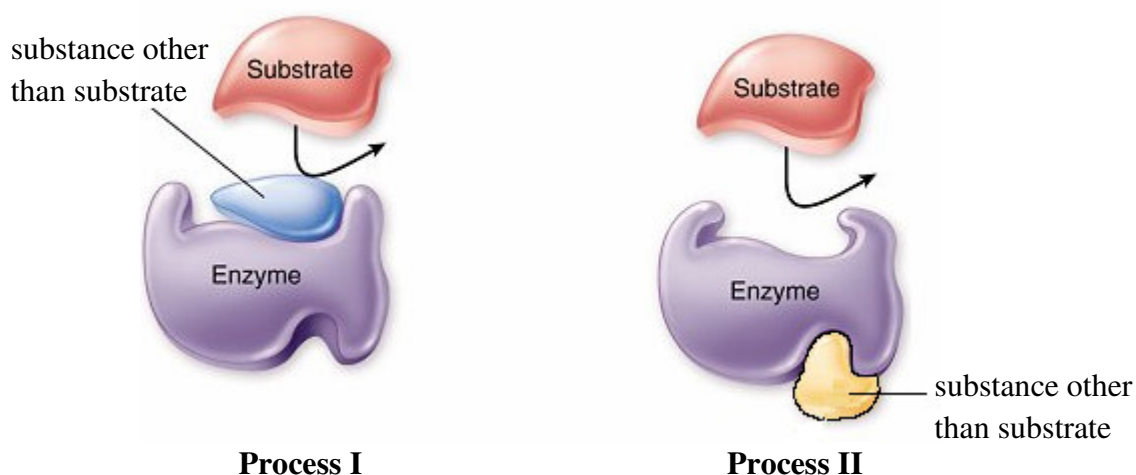
Weaker responses wrote that these sounds are produced when valve in front of aorta and pulmonary vein closes. Some of them wrote that *lub* sound is produced when right atrium receives deoxygenated blood and *dub* sound is produced due to pumping action/ both the sound are produced by contracting and relaxing of atriums and ventricles or heart chambers.

Example:

When blood flows through the heart so the muscles contract and relax creating the sound of lub-dub.

Extended Response Questions (ERQs)

Question 10a



Name the phenomenon shown in the above diagrams. Describe the mechanism and result of each process.

Better responses correctly identified the phenomenon as inhibition/ reversible inhibition. They also described the mechanism and result of both the processes. They wrote that in process I the inhibitor bears structural similarity with the substrate and thus is selected by the binding site. It is not able to activate the catalytic sites; as a result product will not form. Whereas, in process II, the inhibitor attaches to the enzyme at a point other than the active site which alters the structure of the enzyme in such a way that even if the genuine/ original substrate binds to the active site, the enzyme cannot catalyse the reaction.

Example:

The phenomenon shown in the above diagram is Inhibition which is performed by inhibitors. Inhibitors are substances that inhibit a chemical reaction. Process I shows competitive inhibition. A competitive inhibitor resembles a substrate structurally and competes with substrate. If competitive inhibitor is attached with the binding site of active site, it is not able to activate the catalytic site of enzymes and hence no product is formed. Its effect can be neutralized by increasing substrate concentration. Process II shows non competitive inhibition. A non-competitive inhibitor attaches with the enzyme at a place other than the active site and forms an enzyme-inhibitor complex. It alters the shape of enzyme in such a way that even if genuine substrate combines with enzyme catalysis fails to take place and no product is formed. Its effect can not be neutralized by increasing substrate concentration. Both competitive and non competitive inhibitors are type of reversible inhibitors and their effect can be neutralized or reversed. In general, Inhibitor is a chemical any substance that combines with enzyme in place of substrate and inhibits the formation of product.

Weaker responses identified the phenomenon as enzyme-substrate complex/ prosthetic group/ feedback inhibition/ enzymatic reaction/ lock and key model. Based on wrong identification most of the responses described lock and key phenomenon between enzyme and substrate. Some of the responses described the stimulus in words instead of giving the correct description.

Example:

The phenomenon shown is the enzyme-substrate complex. Enzymes are globular proteins and they are highly specific in their actions. They have active sites which are highly specific and only certain substrates can lock with the active sites. Enzyme and substrate form the enzyme-substrate complex, which is then converted fully into the product.

In process I, an enzyme is shown with an active site but some other substance has taken place other than the substrate, which has not locked up with the active ~~site~~ site and the enzyme-substrate complex is not formed.

In process II, the enzyme has an active site and a substrate is also present, ~~but~~ with the particular shape, that could actually be locked up with the enzyme, and an enzyme-substrate can be formed. Other than the active site, another substance is also present, which locked itself with the another site of enzyme, but it does not form the enzyme-substrate complex molecule.

Hence, only substrate and enzyme can form an enzyme-substrate complex. It is also necessary that high temperatures should not be applied to the enzymes, because it can permanently denature the active sites of the enzymes.

Question 10b

Classify sucrose, cellulose and glucose as monosaccharide, disaccharide or polysaccharide. Describe the properties of these molecules on the basis of which you have classified them into their respective types.

Better responses classified the given groups of carbohydrates correctly. These responses identified sucrose as disaccharide, cellulose as polysaccharide and glucose as monosaccharide. Such responses also described the properties of each molecule on the basis of which they are classified, e.g. number of molecules, type of molecules and glycosidic linkage.

Example:

Carbohydrates are ~~further~~ classified into three types.

MonoSaccharides:- These are known as simple sugars. They cannot ^{be} further hydrolysed into simpler ones. They yield from ~~2 to 10~~ ^{some} carbon atoms. Glucose is one the examples of this type. Glucose formula is $C_6H_{12}O_6$. This is simple and can not be further hydrolysed.

Oligosaccharides:- In this type the sugars are more complex as compared to Monosaccharide. On hydrolysis it gives monosaccharides, they are less soluble as compared Monosaccharide and are less sweet. When two monosaccharides combine it will make up a disaccharide. and Sucrose is one of the main examples of disaccharides. As it is obtained when glucose and fructose combine together.

Polysaccharides:- Its clear from the name that poly means many while saccharides means sugars. So it means that this kind of molecules includes a large number of Monosaccharides, or disaccharides. These are tasteless and insoluble in water. These are complex ones and On hydrolysis process Monosaccharides and Disaccharides are obtained. Cellulose is one the example in polysaccharides molecules, they are so much complex and Cellulose is the basic component of cell wall of plants. The Carbon atoms in this type are of a very large number.

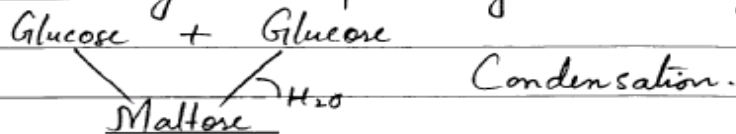
Weaker responses identified cellulose as disaccharide and sucrose as polysaccharide/ monosaccharide. Some of them wrote about hydrolysis of glucose or indigestibility of cellulose. Few responses mentioned that lipids/ proteins/ carbohydrates are monomers of disaccharides or polysaccharides are made up of combination of disaccharides like maltose and fructose.

Example:

Sucrose is a monosaccharide. Sucrose is produced in the form of starch in the potato, human & carbohydrates also.

⇒ Cellulose is a disaccharide. Cellulose can not be digested in human body because in human body there is no any bacteria which can digest the cellulose in the products. Cellulose is digested in animal body because that particular bacteria is present in the animals. Cellulose is the digested material of animals.

⇒ Glucose is a polysaccharide which is the simplest form of carbohydrates. Glucose gives the energy to the body.



Glucose is present in all organisms. Glucose is the base product of carbohydrates. Just as lipids are the base product of proteins. Glucose can form with galactose → Lactose. Glucose with glucose → Maltose. Glucose with fructose → Sucrose.

They all are the biological molecules which catalyse the metabolism & anabolism.

Glucose shows the reducing sugar in the solutions of carbohydrates. We can take food by carbohydrates & starch formation. Inside our body many glucose & carbohydrates & proteins are present. Catabolism is also part of it.

Monosaccharides means one glucose.

Polysaccharides means more than one/two glucose.

Disaccharides means two bounded glucose.

Question 11a

Describe any FOUR adaptive characteristics of bryophytes that support their survival on land.

Better responses mentioned the adaptive features of bryophytes and described how these features help bryophytes to survive in terrestrial environment. Such responses highlighted features such as formation of a compact multicellular body and elaborated that this helps in the conservation of water by reducing cell surface area exposed to dry land conditions. Similarly, development of photosynthetic tissues into special chambers was mentioned with a supporting reason that due to this carbon dioxide is absorbed without losing much water and exposure to light. Rest of the features included formation of rhizoids (help in the absorption of water from the soil and provide better anchorage to the plant)/ heterogamy (production of two types of gametes is evolved, forming non-motile egg containing stored food, for better chances of survival and motile sperms for more chances of fertilization)/ protected gametes (gametes are produced and protected by the special multicellular organs which allows gametes to survive in the harsh terrestrial conditions)/ inside development of the embryo (multicellular embryo is formed which is retained and protected inside the female reproductive body during its development. This increases the chances of survival of the embryo)/ alternation of generation (enables the plants to produce and test the best genetic combinations for adapting to the versatile terrestrial conditions).

Example:

Bryophytes are the first ^{land} plants. These are the low profile plants and are said to have arisen from green algae. There has been a lot of modification in these first land plants for their survival on land.

1) Formation of Rhizoids: These plants were having a root like branching structure Rhizoids. That actually helps Bryophyta to absorb enough water for their survival. Rhizoids anchor the plants within the soil and increase the surface area for the absorption of water.

2) Heteromorphic alternation of generation: Bryophyta shows a heteromorphic alternation of generation in which conspicuous haploid gametophyte alternates ^{with} ~~which~~ less conspicuous diploid sporophyte generation. Due to this alternation of generation every time the gametophyte and sporophytes are produced with the different genetic makeup and the most compatible and the one more adapted to environmental changes are selected by nature.

3) Protection of gametes: In the land adaptations there was formation of gametes within an sterile jacket like structures that are protective such as there ^{is} ~~was~~ the formation of male gametes in antheridia and are protected whereas

female gametes are produced within ^{archegonia} ~~antheridia~~ and are protected from ^{loss} ~~tear~~ and damage. whereas ⁱⁿ some of the ^{plants} ~~antheridia~~ and archegonia combines with sterile hairs and form perianthes ~~as~~ a protective structure.

4) Formation of waxy cuticle and absorption of CO_2 : The body of Bryophyta are thallus like and they are having numerous of millions of cells which reduce the surface for the loss of water but the surfaces which are exposed to water are protected by a waxy cuticle ^{which prevents the H_2O loss} and CO_2 absorption occurs through the aerating pores ^{through aerating pores} present on the upper surfaces and CO_2 enters and gaseous exchange occurs through filamentous photosynthesising cell in the plant body.

Weaker responses described that body of bryophytes are differentiated into roots, stem and leaves. Some of the responses described formation of flower/ fruits. Few responses wrote that bryophytes are considered as invertebrate plants. Other responses mentioned about irregular body/ prokaryotes/ presence of vascular tissues/ bundles reach all the way to the tip of the leaf, providing every organ with water/ show absorptive mode of nutrition/ diploblastic/ have radial symmetry/ heterotrophs.

Moreover, most of the weaker responses only highlighted one or two characteristics of bryophytes without describing their importance. Here, students are advised to learn the difference between two cognitive levels, i.e. knowledge and understanding. If the question demands to list down the features only then the examiner(s) do not expect description. But if the question asks to describe with supporting ideas/ points/ reasons then candidates are expected to relate one part of the answer to the other to meet the demand of the question.

Example:

The four adaptive characteristics that make bryophytes survival on land possible.

1- Distinct root, stem and leaves:

They plants have roots that can go deep and absorb water. If they didn't have distinct roots they would have to stay in damp places where water is in ~~an~~ excess. The stem helps them to reach up and absorb more light.

2- P Formation of flowers and fruit. The flowers will be helpful in pollination and fertilization. Hence make reproducing flowers at a faster rate.

3- Water independent fertilization:

They plants can easily form zygotes without dependence on water. As water is not present on all parts of ~~the~~ land. This adaptation helps the survival to a great degree.

4- II Retention and development of megaspore inside the megasporangium:

If the megaspore was motile just like the microspore fertilization the chances of fertilization

would reduce greatly. When they fuse ultimately they form seed. A seed has a ~~re~~ temperature and moisture ~~&~~ resistant covering which enables its survival by ~~many~~ spore. The male and female reproductive organ are different.

The vascular tissues and bundles reach all the way to the tip of the leaf; providing every organ with water. It has photosynthetic pigments which enable them to make their own food. They are heterosporous. Their sex organs are protected by special structures. This is why they can easily survive on land.

Question 11b

Describe the occurrence and treatment of the following disorders of the gastrointestinal tract.

- i. Peptic ulcer
- ii. Piles

Better responses wrote about the occurrence and treatment of peptic ulcer and piles using specific key phrases. E.g. in case of peptic ulcer, break down of mucus layer, eating away of digestive walls/ formation of sores. Similarly, in case of piles, dilation of veins in the anorectal mucosa, bleeding during bowel movement, constipation, difficulty in expelling faeces. With reference to the treatment of peptic ulcer better responses mentioned use of medicines which reduce acid production or use of antacids. Whereas, for piles treatment includes, use of food softeners, such as roughage/ fibre in food or laxatives or surgery.

Example:

i- Peptic Ulcer: The inner wall of stomach ~~edge~~ is usually covered with mucus. Mucus is a thick secretion secreted from mucous cells or glands. When ~~the~~ this mucus layer/membrane breaks ^{down}, the digestive enzymes begin to eat away the walls of the stomach and results in a sore called ulcer. Occasionally an ulcer is so severe that a hole develops in the stomach and contents of digestive tract spill into the abdominal cavity. This can cause severe infection and can be fatal if immediate care is not sought. The causes of peptic ulcer is usually excessive secretion of gastric juice in the stomach. Taking in of spicy food, alcoholic beverages, coffee, tea, smoking can cause peptic ulcer. Treatments of peptic ulcer ~~is~~ ^{are} usually the preventions which can reduce the severity and sometimes medications are prescribed. Not eating much spicy food, alcoholic beverages, coffee and not smoking can reduce the severity. If medicines are prescribed they are to be taken on the ~~the~~ respective times.

ii- Piles & Piles or hemorrhoids are masses of dilated, tortuous veins in the anal canal mucosa. These masses may sometimes start bleeding during bowel movements. Situation may aggravate when the patient suffers from constipation. The urge to defecate is

suppressed and it becomes difficult to expel out faeces. The person may sometimes suffer from emotional disturbance due to the physical distortion of rectum. The only treatment prescribed is the use of food softeners such as roughage in food and laxatives. The patients are advised not to sit on hard seats. In severe cases, sometimes these masses are removed surgically.

Weaker responses failed to write precise answer. Most of the responses gave generalised answers such as, peptic ulcer causes burning/ pain or piles affects our excretory system/ piles is caused by internal body health/ piles is a rectum disorder/ it takes place in liver/ food is not digested properly/ it can be treated by medicines or antibiotics. One of the responses wrote about intake of vitamin, proteins, calcium to treat piles. Another type of weaker responses was unable to differentiate between prevention and treatment. Such responses wrote that one should exercise daily or take a balanced diet to treat piles or one should avoid spicy food or smoking to treat ulcer. Here, candidates are advised to understand that preventions/ preventive measures are followed before the onset of disease/ disorder whereas, treatment is prescribed once the disease has occurred.

Example:

Gastrointestinal tract is an important organ of digestive system which almost half of the digestion takes place. Some diseases/disorders related to the gastrointestinal tract are given follow:

1- Peptic ulcer:

peptic ulcer is a disorder of gastrointestinal tract which causes the burning of lining organs of digestive system.

This disease/disorder is caused by eating too much food especially spicy food, laying down after heavy meal and consumption to Alcohol. This disorder can be treated by medicines like Sulfonamide group, avoiding spicy food or little exercise after heavy meal.

Piles :- Piles is the gastrointestinal disease in which incomplete digestion of food occurs. This disorder is caused by bacteria which can enter our body by contaminated water if we drink it. The bacteria distorts the cell of villi & reduces surface area for absorption. This disease can be cured by medication, drinking clean & preserved water.