Aga Khan University Examination Board
Notes from E-Marking Center on SSC I Biology Examination
May 2014

Introduction

This document has been produced for the teachers and candidates of SSC Part I (Class IX) Biology. It contains comments on candidates' responses to the 2014 Secondary School Certificate (SSC-I) Examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

General Comments

This report 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. Whereas, the candidates' responses shared in this document represent some specific example(s) of the mentioned comments.

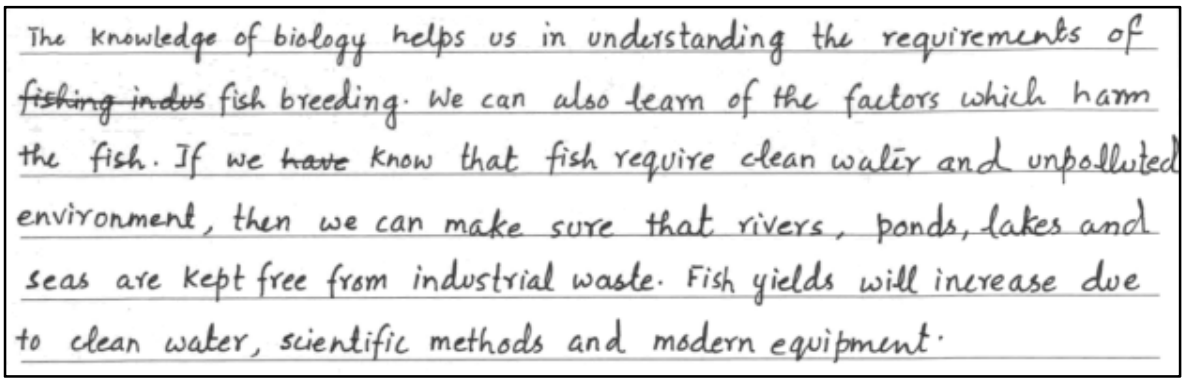
Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that requires candidates to respond by integrating knowledge, understanding and application skills they have developed during the course of study. Candidates are advised 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:

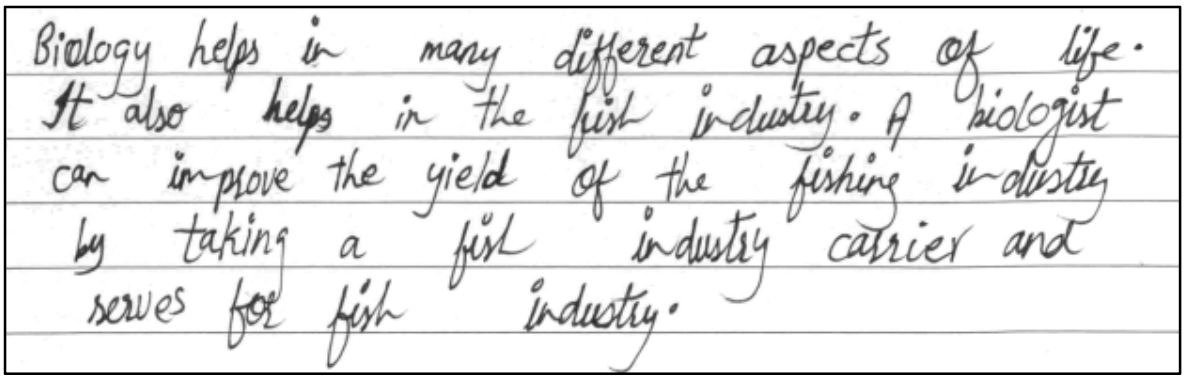
Question 1a

Better responses indicated the correct ways which can bring improvement in fish yield. For instance, introducing better fishing methods/ promoting awareness about breeding season/ proper storage/ suitable temperature/ devising better equipment/ preventing disease spread/ pollution.
Example:


The knowledge of biology helps us in understanding the requirements of ~~fishing indus~~ fish breeding. We can also learn of the factors which harm the fish. If we ~~have~~ know that fish require clean water and unpolluted environment, then we can make sure that rivers, ponds, lakes and seas are kept free from industrial waste. Fish yields will increase due to clean water, scientific methods and modern equipment.

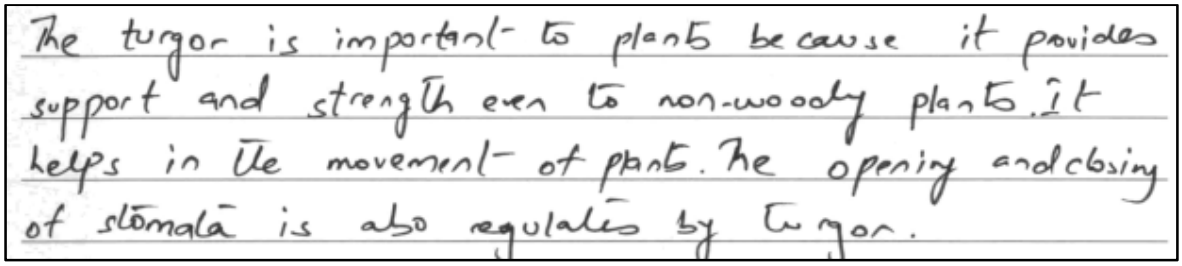
Weaker responses indicated that students were unable to understand the demand of the question. A few candidates misunderstood the question as importance of biology and narrated a generalized answer, in which no specific or focused point was included. They wrote about biology as the study of life which gives information about living things and fishing industry. Very few candidates wrote about the importance of fish in our diet or described bio-economics without emphasizing on the role of a biologist.

Example

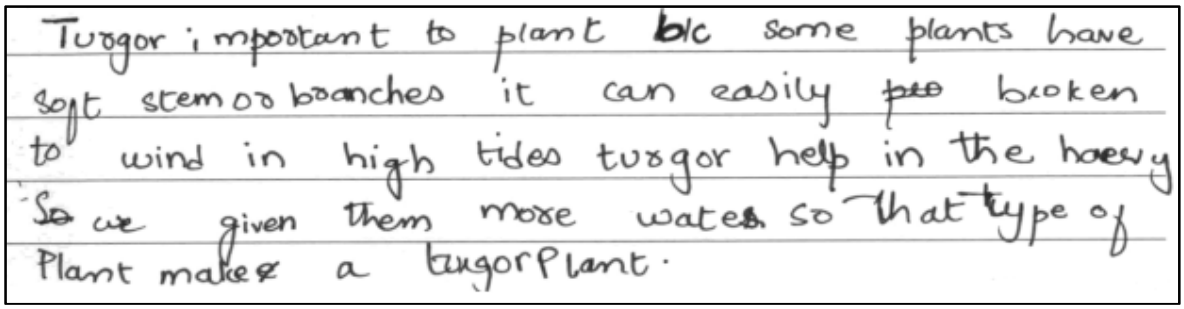

Biology helps in many different aspects of life. It also helps in the fish industry. A biologist can improve the yield of the fishing industry by taking a fish industry carrier and serves for fish industry.

Question 1b

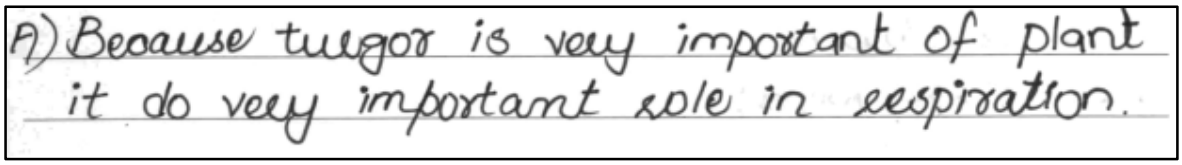
Better responses highlighted the importance of turgor in plants that it maintains the shape of the cell/ helps in opening and closing of the stomata/ provides support and strength to the plants.
Example:


The turgor is important to plants because it provides support and strength even to non-woody plants. It helps in the movement of plants. The opening and closing of stomata is also regulated by turgor.

Weaker responses gave generalized answers like the role of turgor in helping plants to grow. A few of these wrote that turgor is important to plants because some plants have soft stems and branches which can easily break due to wind or high tides. Some candidates mixed up the concept of turgor with osmosis and its different conditions.
Example:


Turgor important to plant bic some plants have soft stem or branches it can easily ~~pro~~ broken to wind in high tides turgor help in the heavy So we given them more water so that type of Plant makes a turgor Plant.

Example:


A) Because turgor is very important of plant it do very important role in respiration.

Question 2

Better responses displayed proper understanding of the question which was evident through the way the candidates gave complete set of instructions for the experiment and also devised a suitable control set up. Most of them wrote about papaya as a tenderizer in cooking. They designed their procedure by adding some papaya to meat in one group (experimental group) and taking meat alone in the other group (control set up). After cooking both forms of meat, it was observed that the meat with papaya was tenderized faster as compared to the meat without papaya.

Some candidates chose Biuret test as the procedure of their experiment. They named specific reagents and wrote about the colour change.

Example:

1. Take a piece of raw meat (as it is rich in proteins) and apply some papaya on the raw meat. You will notice that the meat becomes soft
2. Take a piece of raw meat and leave it as it is.
3. Take the piece of meat which had papaya applied on it and cook.
4. Take the piece of meat which was left untouched and cook.

You will notice that the piece of meat which had papaya applied was cooked quickly, comparative to the meat which was not processed. This is because papaya had tenderized the meat due to its protein digesting enzyme.

Weaker responses displayed elements of rote memorization as some of them drew flowchart to show the sequence of steps in a biological method (observation – hypothesis – deduction – experiment – theory – law). Another example of a weaker response includes a procedure in which candidates wrote to take a group of people and give protein component to them for eating, and then give papaya to them. To another group give protein component without papaya. See which group digests easily. The above response does not indicate which one is experimental set up and which one is control set up. Moreover, no information was provided on how to observe the rate of digestion in each group.

One of the responses wrote that papaya should be examined under microscope so that enzyme digesting protein should be seen. A few of them also wrote about the nutritional value of papaya in diet while some wrote about the characteristics of a hypothesis.

Example:

Example:

1. The hypothesis should be in the form of statements.
2. The hypothesis is not confirmed and can be changed later.
3. It should be made with the help of observation.
4. If - then logic can be used in ~~hypohe~~ hypothesis.

use papaya for digestion. papaya is very good for our skin. when we eat papaya we can easily digest our food. the given hypothesis is said papaya contains an enzme which digest the proteins. if we can eat papaya then we digest our food if we dont take such type of fruit then some people have faced the problem of pilles.

Question 3

Better responses highlighted the events which would not occur if G1 phase is missed out. For instance, the cell will not be ready to enter the next phase i.e. S phase/ the cell will not increase its supply of proteins or will not increase number of mitochondria, ribosomes and will not grow in size/ enzymes will not be synthesized.
Example:

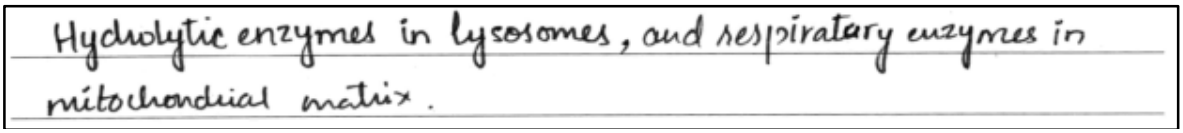
If G1 phase of the interphase of cell cycle will not take place the cell will not grow in size, number of organelles will not increase and most importantly the enzymes required for the duplication of chromose ~~word~~ will not be synthesized. Hence no S-phase will occur ~~and~~ so no ~~duplica~~ chromosomes would duplicated and hence no cell division will take place.

Weaker responses included; no synthesis of protein and DNA would take place/ abnormal growth of cell will occur/ cell will divide abnormally and give the cancerous cell, mutation will occur/ chromatin network will not condense or uncoil, daughter cell will be abnormal.
Example:

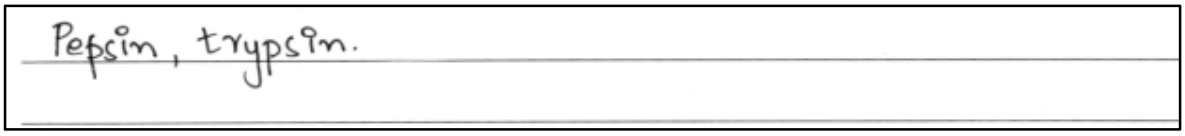
- The cell would'nt be properly prepared for the division.
- The proteins, organelles and enzymes won't replicate.
- There will be occurence of abnormality.
- The malfunctioning by mutation will take place.

Question 4

Better responses mentioned two examples of intracellular enzymes. Responses naming the processes in which intracellular enzymes are used, such as, enzymes of cellular respiration or lysosomal enzymes were also awarded marks.
Example:



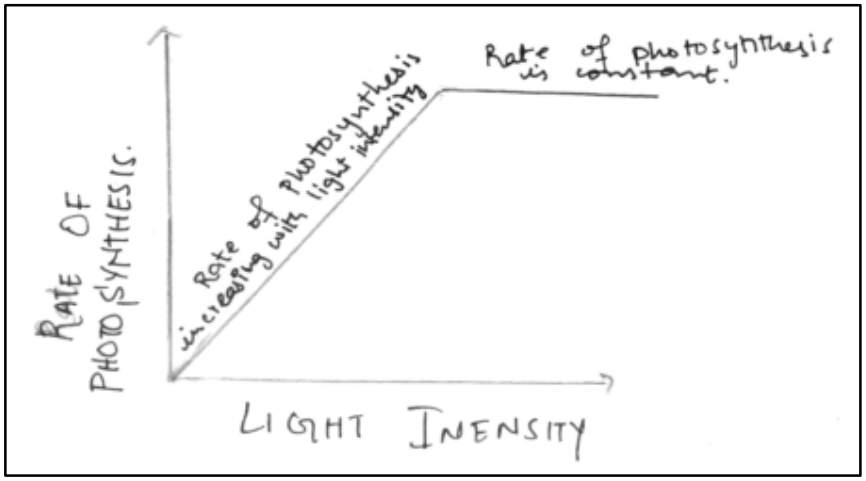
Weaker responses named extracellular enzymes like amylase/ trypsin/ pepsin/ protease/ lipase.
Example:



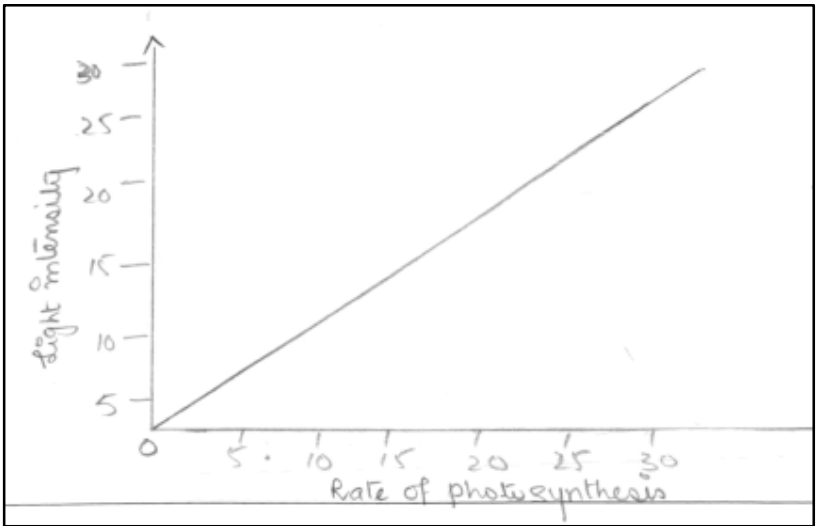
Question 5a

Better responses labelled the X-axis and Y-axis correctly i.e. light intensity on X-axis and rate of photosynthesis on Y-axis. The curve of the graph showed an initial increase in the rate of photosynthesis which then becomes constant regardless of the increase in light intensity.

Example:



Weaker responses labelled the axis wrongly i.e. swapping their positions. Others showed the effect with a straight line (directly proportional) or a bell curve.
Example:



Question 5b

Better responses showed that the stimulus was read carefully before drafting the response. Such responses made a comparison between the dietary requirements of a child and an adult with reference to the food components interpreted from the given table. They also wrote about the dietary requirement of a labourer with particular focus on his physical activities.
Example:

b. The table shows the composition of diet of different vulnerable groups. (3 Marks)

Group	Diet
Child (4-6 years)	Meat, egg, rice and potato
Adult (above 50)	Fish, apple, bread and spinach
Labourer	bread, pasta, beans, egg, Butter. e.t.c.

i. Why are the dietary requirements of a child different from those of an adult?

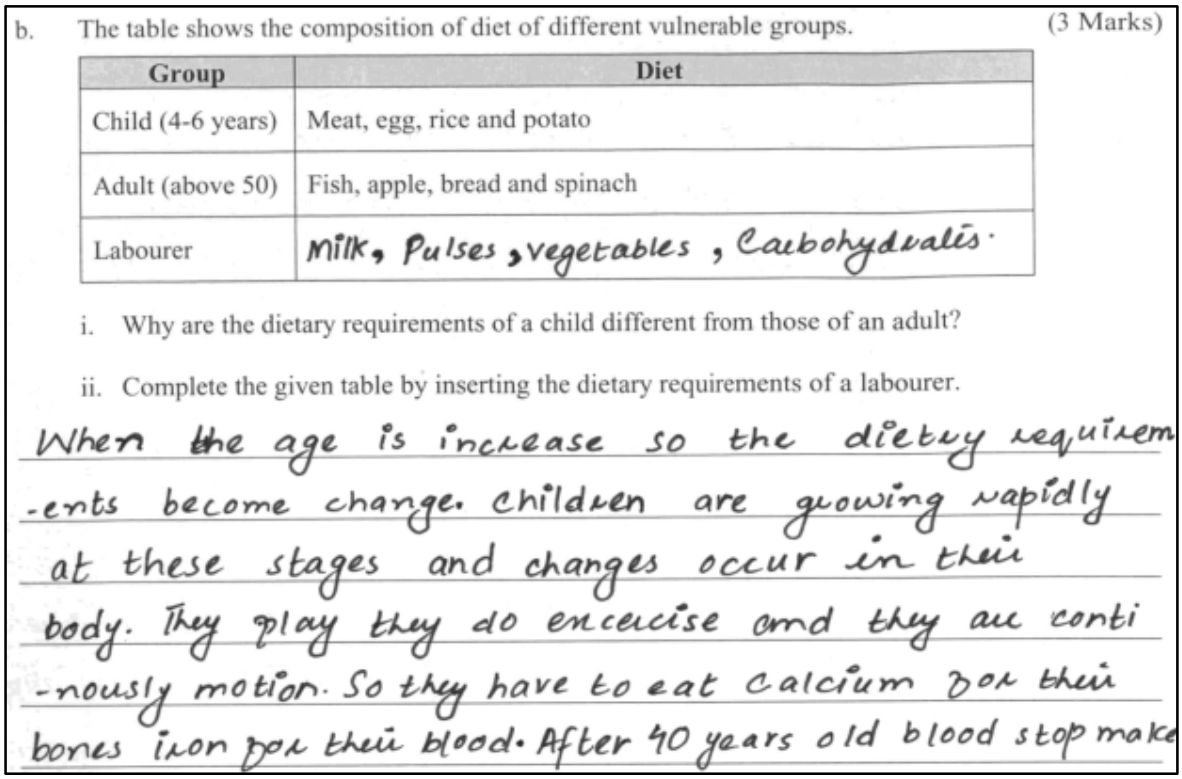
ii. Complete the given table by inserting the dietary requirements of a labourer.

The dietary requirements of a child is different from those of an adult because a growing Child need more protein as compare to ~~an~~ an adult. Proteins and carbohydrate provide energy and Children need more energy while an adult above 50 need more vitamins.

Weaker responses wrote about the dietary requirements of a child without referring to the food table given as stimulus. This shows that candidates need to devote more time in reading and understanding the stimulus based questions before outlining their responses. The food items in child's diet focus on carbohydrates and proteins, whereas in adults diet minerals and vitamins are focused mainly. Candidates wrote about child's high metabolic rate/ growing age/ more energy requirement but failed to highlight the reasons for less fats/cholesterol diet in adults. Some of them focused on calcium

requirement in children whereas, the stimulus contains food items which collectively highlight sources of proteins and carbohydrates.

One of the responses mentioned that children need less protein and carbohydrates because they did not work, but adults needed more carbohydrates and protein because they worked more than the children.
Example:



b. The table shows the composition of diet of different vulnerable groups. (3 Marks)

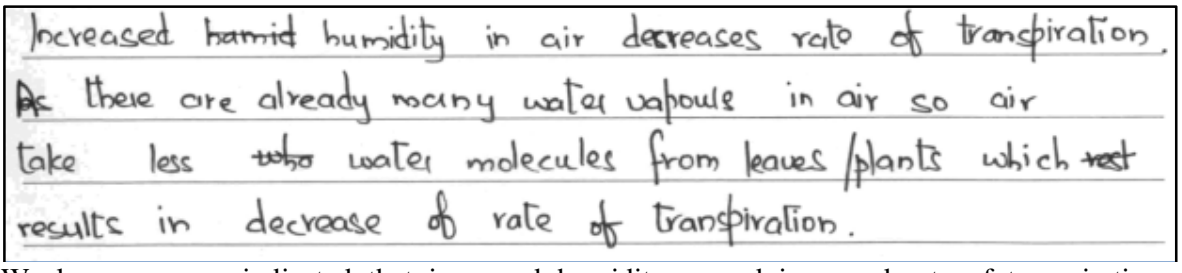
Group	Diet
Child (4-6 years)	Meat, egg, rice and potato
Adult (above 50)	Fish, apple, bread and spinach
Labourer	Milk, Pulses, vegetables, Carbohydrates.

i. Why are the dietary requirements of a child different from those of an adult?

ii. Complete the given table by inserting the dietary requirements of a labourer.

When the age is increase so the dietry requirem-ents become change. children are growing rapidly at these stages and changes occur in their body. They play they do encercise and they are conti-nously motion. So they have to eat Calcium for their bones iron for their blood. After 40 years old blood stop make

Question 6a
Better responses stated the correct effect of increased humidity on the rate of transpiration i.e. low. Such responses further elaborated the phenomenon that increased humidity meaning more water vapours around the plant leaves. In this way the atmosphere around plant leaves will be saturated and the concentration gradient between leaves and air will be weak.
Example:



Increased ~~hamid~~ humidity in air decreases rate of transpiration. As there are already many water vapoule in air so air take less ~~toto~~ water molecules from leaves /plants which ~~rest~~ results in decrease of rate of transpiration.

Weaker responses indicated that increased humidity caused increased rate of transpiration or as humidity increased the rate of transpiration increased because the water evaporated quickly from the surface of plants.
Example:

If the humidity in the air increases, the rate of evaporation will be increased too and water molecules will quickly leave the leaf surface. The high rate of evaporation ultimately increase the rate of transpiration too.

Question 6b

Better responses stated the correct cause of leukemia i.e. it is caused due to cancerous mutation in bone marrow cells or in the lymph tissues. Similarly, they wrote that mutation in the gene of haemoglobin causes thalassemia. Such responses indicated blood transfusion or bone marrow transplant as treatment of both diseases.
Example:

(3 Marks)

Leukaemia:-	Thalassemia:-
Causes:- Mutation (change in gene) occurs in white blood cells	Causes :- Mutation (change in gene) occurs in hemoglobin.
Treatment:- Blood is changed regularly or bone marrow transplant is done.	Treatment :- Blood is changed regularly or bone marrow transplant is done.

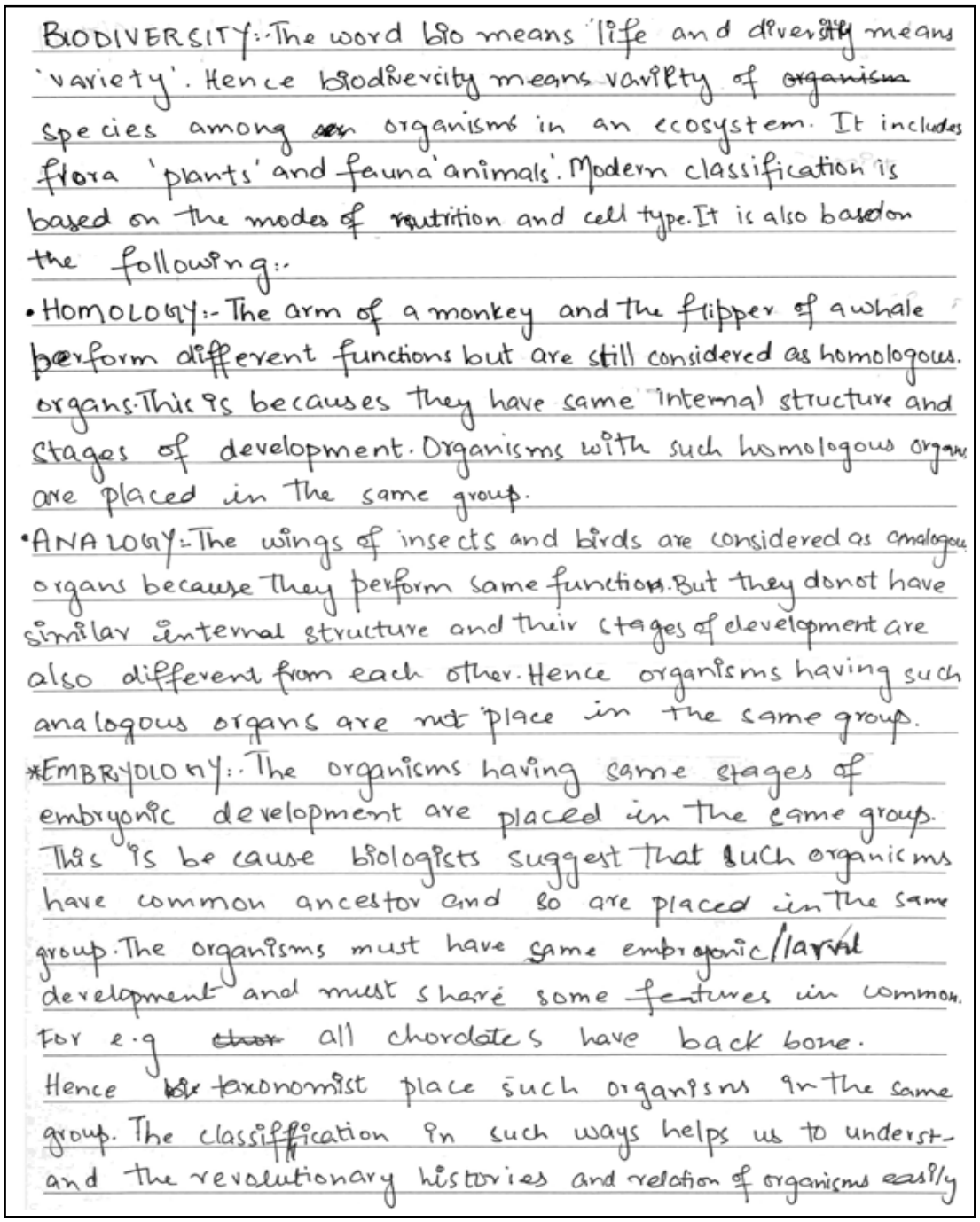
A variety of weaker responses were found. It seems that the SLO has not been focused properly during class room teaching. Some of the examples include: " Leukemia is caused due to dengue fever/ leukemia is caused by less WBC in the blood/ leukemia is caused by lack of calcium/ leukemia is a disease of RBC and thalassemia is a disease of WBC/ thalassemia is caused by the shortage of blood/ leukemia and thalassemia are treated by no salts in diet".
Example:

Leukaemia and thalassemia, both are the diseases of blood cells, leukaemia is the disease of red blood cells while thalassemia is the disease due to white blood cell. This disease is caused when more death of cells occurs. For this treatment a person should eat a diet which would help in rebuilding new blood cells

Question 7a

Better responses defined the term biodiversity and built a proper link of homology, analogy and embryology with the classification of living organisms. Most of the responses elaborated their answers with relevant examples.

Example:

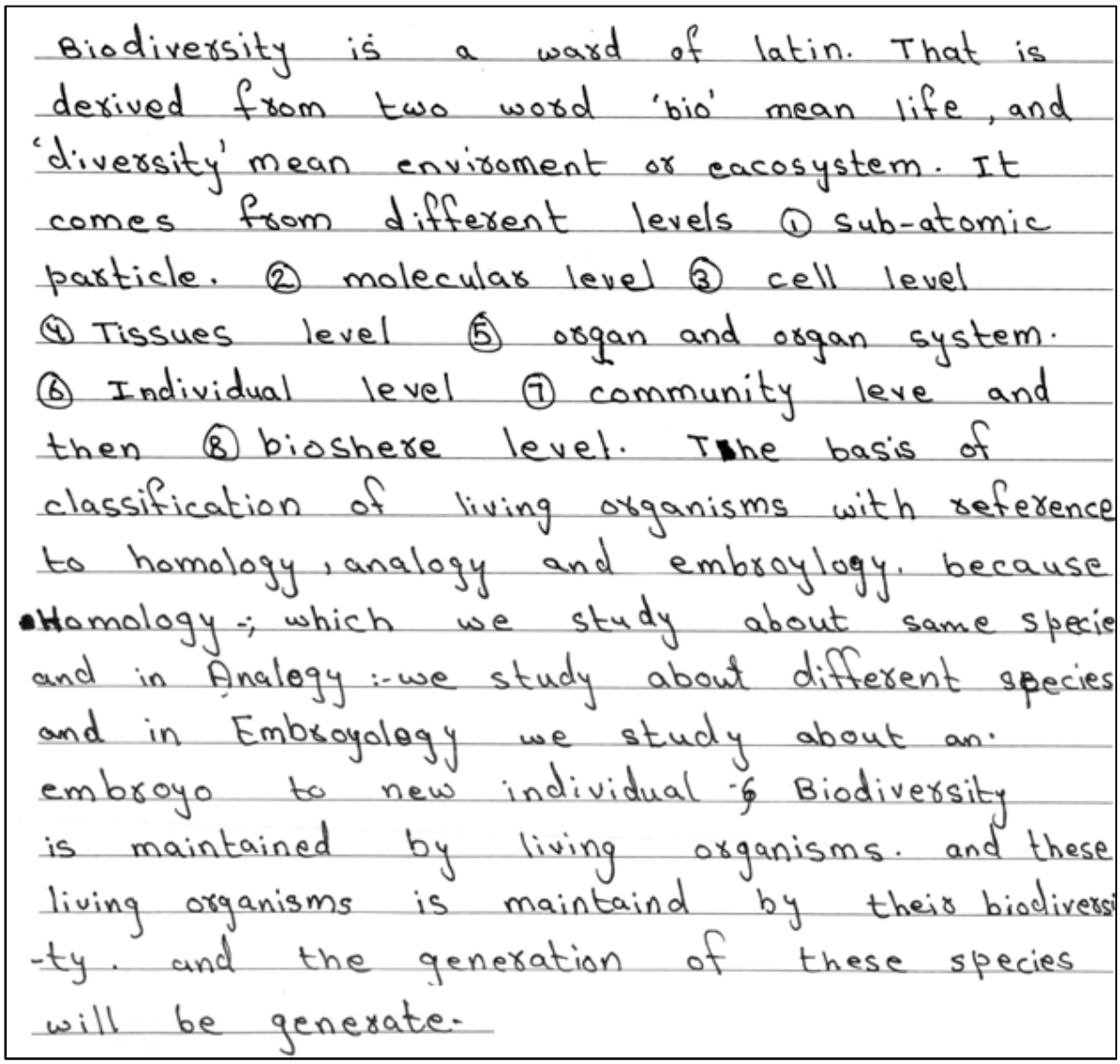


BIODIVERSITY:- The word bio means 'life' and diversity means 'variety'. Hence biodiversity means variety of ~~organisms~~ species among ~~ser~~ organisms in an ecosystem. It includes flora 'plants' and fauna 'animals'. Modern classification is based on the modes of ~~nutrition~~ and cell type. It is also based on the following:-

- HOMOLOGY:- The arm of a monkey and the flipper of a whale ~~p~~perform different functions but are still considered as homologous organs. This is because they have same internal structure and stages of development. Organisms with such homologous organs are placed in the same group.
- ANALOGY:- The wings of insects and birds are considered as analogous organs because they perform same functions. But they do not have similar internal structure and their stages of development are also different from each other. Hence organisms having such analogous organs are not place in the same groups.
- *EMBRYOLOGY:- The organisms having same stages of embryonic development are placed in the same group. This is because biologists suggest that such organisms have common ancestor and so are placed in the same group. The organisms must have same embryonic/larval development and must share some features in common. For e.g ~~thor~~ all chordates have back bone. Hence ~~bir~~ taxonomist place such organisms in the same group. The classiffication in such ways helps us to understand the revolutionary histories and relation of organisms easily

Weaker responses defined homology and analogy without correlating their role with the classification of living organisms. A considerable number of candidates wrote about the units of classification i.e. kingdom, phylum, class, so on. Some of the responses described the Five Kingdom Classification System while others described the classification of the living organisms on the basis of autotrophs, heterotrophs and the structure of DNA. Few responses classified the organisms on the basis of prokaryotes and eukaryotes.

Example:


Biodiversity is a ward of latin. That is derived from two word 'bio' mean life, and 'diversity' mean enviroment or eacosystem. It comes from different levels ① sub-atomic particle. ② molecular level ③ cell level ④ Tissues level ⑤ organ and organ system. ⑥ Individual level ⑦ community leve and then ⑧ bioshere level. The basis of classification of living organisms with reference to homology, analogy and embroylogy. because •Homology -; which we study about same specie and in Analogy :-we study about different species and in Embroyology we study about an embroyo to new individual -§ Biodiversity is maintained by living organisms. and these living organisms is maintaind by their biodiverss -ty. and the generation of these species will be generate.

Question 7b

Better responses wrote about the contribution of each scientist with reference to the development of cell. Such responses followed the chronological order in which step-wise advancement was made; thus, scored full marks.
Example:

Science is an evergrowing knowledge. New experiments are done and long held theories are modified or replaced by new ones. In the past, many scientists made discoveries regarding the cell. Following are the discoveries they made:

1) Aristotle:- The earliest knowledge of biology comes from Greeks. Aristotle presented the idea that all living organisms are somehow related to each other. Later it was discovered that all organisms are related because they share a single unit of life i.e 'cell'.

2) Robert Hooke: Robert Hooke, a British scientist examined a thin slice of cork under his own made light microscope. He observed a honeycomb of tiny compartments which he called as 'cellulae'. His term came to us as cells.

3) Antonie van Leewenhoek: He observed tiny living organisms from pond and examined them under the microscope. He called them "animalcules".

4) Robert Brown:- Robert Brown discovered nucleus in the cell after examining the cell in a microscope.

5) Matthias Schleiden:- Matthias Schleiden, a German botanist studied plant tissues and proposed that "all plant tissues are aggregates of individual cells which are fully independent".

Theoder Schwann: He was a German zoologist. He studied animal tissue and proposed "all animal tissues are also composed of individual cells". Schleiden and Schwann made the cell theory in its initial form. It was later modified by other scientists. Cell theory states:-

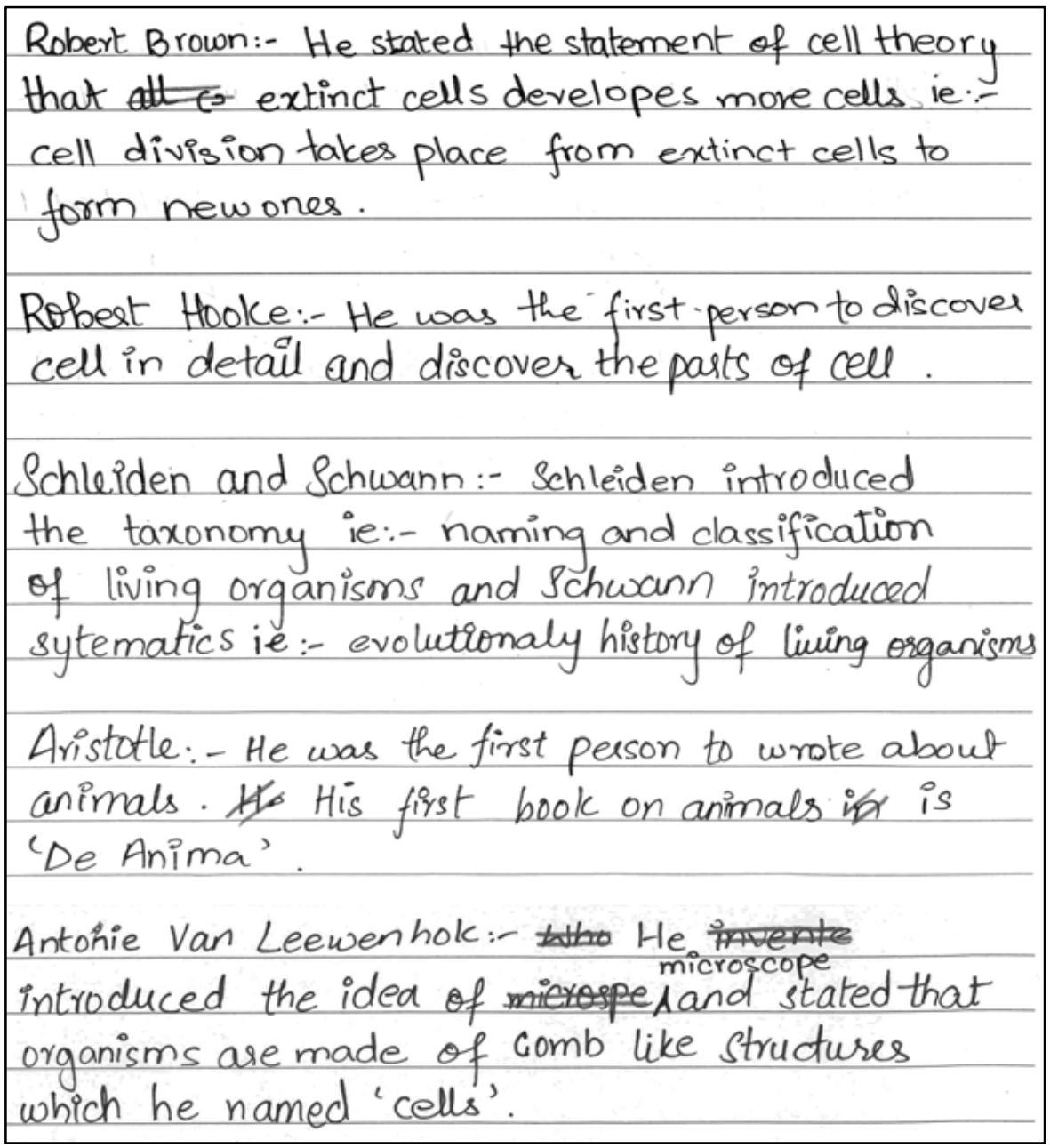
1) All organisms are composed of cells.

2) Cells are the smallest living thing, the basic unit of organization for all.

3) Cells arise only by divisions in pre-existing cells.

We now understand the concept of cells making cell theory as our base which is the result of all the discoveries made by the above listed scientists.

Weaker responses were unable to put the contribution of the given scientists in correct order. Some of the responses mixed up the contribution of Robert Hooke with Robert Brown and a few responses mixed up the contribution of all scientists.
Example:


Robert Brown:- He stated the statement of cell theory that ~~all~~ extinct cells developes more cells ie:- cell division takes place from extinct cells to form new ones.

Robest Hooke:- He was the first person to discover cell in detail and discover the parts of cell.

Schleiden and Schwann:- Schleiden introduced the taxonomy ie:- naming and classification of living organisms and Schwann introduced sytematics ie:- evolutionaly history of living organisms

Aristotle:- He was the first person to wrote about animals. ~~H~~ His first book on animals ~~i~~ is 'De Anima'.

Antonie Van Leewenhok:- ~~tatho~~ He ~~invente~~ introduced the idea of ~~microspe~~ microscope and stated that organisms are made of comb like structures which he named 'cells'.

Question 8a

Better responses showed candidates' command over the structural features of villi and how these features are best adapted to their respective functions. Such responses wrote about circular folds/ finger-like projections/ increased surface area/ richly supplied with blood capillaries. These responses showed candidates' clear understanding of the difference between the route of sugars/ amino acids and fatty acids to enter into the blood.
Example:

In the small intestine the first part is the duodenum, the next in the jejunum and the third is the illeum. The illeum has foldings inside it and on these foldings are numerous finger like projections called the villus. It is single-cell thick layered and is supplied with blood capillaries and a part of the lymphatic duct called the lacteal.

Proteins which breaks into amino acids, lipids into fatty acid and glycerol and carbohydrate into glucose are absorbed in the villi.

i) Role of capillaries:

Amino acids and glucose are absorbed in the small intestine, in the capillaries of the villi. These are then carried on via the hepatic portal vein to the liver. Here the toxins are removed and some food is stored and the rest is transported to the heart via the hepatic vein and from there in enters the blood.

ii) Role of lacteal:

fatty acids and glycerols are also absorbed in the small intestine but in the lacteal of the villus. From here it is transported to the lymphatic duct from where it enters the blood stream.

Like this the digested proteins, carbohydrates and lipids are absorbed in the blood. They get digested in the duodenum and then are passed onto the illeum where they get absorbed and then enter the blood stream.

Weaker responses described the three parts of the small intestine (duodenum, jejunum and ileum) in detail. Some of the responses highlighted only one or two structural features of the villi. Most of them ignored the absorption of fatty acids into the blood via lacteal. Few of them described the whole process of digestion.

Example:

Food enters in Stomach through cardiac Spincher. Gastric glands found in the stomach wall secrete gastric juice. Gastric jvice contains mucous, hydrocloric acid and Pepsinogen. ~~Hcl~~ Hydrocloric acid converts inactive enzyme i.e Pepsinogen in it active form i.e pepsin. Pepsin digest proteins ~~in~~ into Polypeptides and amino acids. Contraction and relaxation of stomach called churing and it digest ~~lips~~ lipids and soup like mixture is ~~for~~ formed called chyme. chyme enters in doudenum which is the part of small intestine through pyloric Spinches. Bile from lives digest lipids through the Process of emulsification. Pencreatic jvice from Pencreas contain protease, lipase and amylase ~~which~~ ~~it~~ enzyme which digest proteins, lipids and carbohydrates respectively. Intestinal jvice from intestine walls contain ~~many~~ many enzyme which digest all kind of food. ~~Then~~ Then food enters in ~~jed~~ ~~jed~~ jejinum where rest of the digestion of food occurs. Then food enters in illeum where absorption of digested food takes Place. Villi helps in absorbtion of digested food. On villi hairs are present. Villi have capillaries and lacteal which helps in absorbtion of digested food.

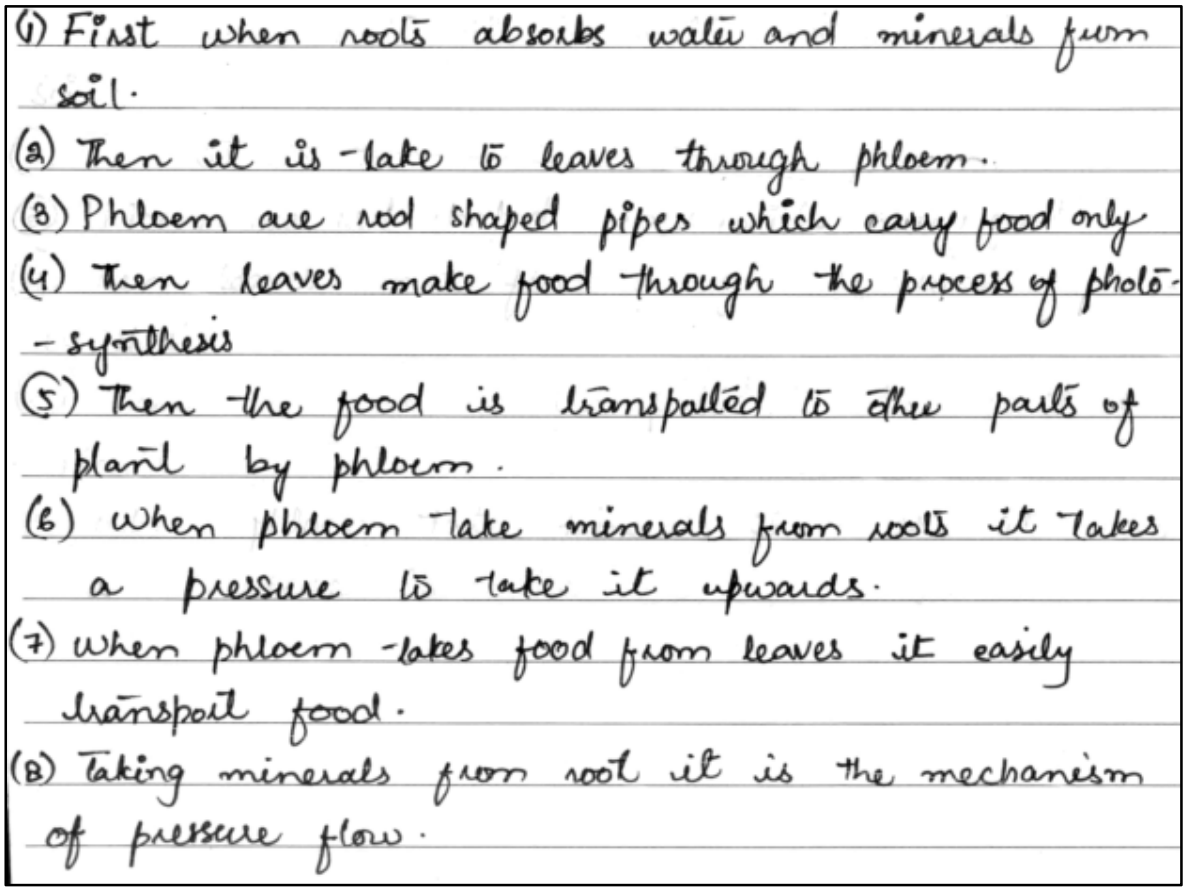
Question 8b

Better responses highlighted the structure of phloem vessels by writing about sieve tubes/ sieve plates. Such responses included the description about source and sink, direction of food, active transport of molecules and solute concentration.

Example:

Phloem vessels (small organic molecules (glucose)) is responsible for the transport of ~~food~~ throughout the plant body. Phloem vessel is made of sieve tube cells and companion cells. The seive tube cells are long and their end walls have small pores. Many of the seive tube cells join together to form long seive tubes. Companion cells (vessel) make proteins for the seive tube cells. In plants the food is moved by phloem. The glucose that is formed during photosynthesis in the mesophyll cells is used in respiration and the excess of it is converted into sucrose. In most plants food is transported in the form of sucrose. The recently accepted hypothesis states that the food is moved in the plant by 'pressore flow mechanism'. In pressore flow mechanism the food is moved from the soorces to the sink. Sources include the exporting organs, typically a mature leaf and storage organs. Sinks are the areas of active metabolism and storage e.g roots, tuber, developing fruits and leaves and growing regions. A storage organ is capable of storing food and then exporting the stored materials. At the source, food (sugars) is moved by active transport and enters into the seive tube cells. Due to the presence of sugars in the seive tube cells their solute concentration increases and the water moves in the seive tube cells from the xylem via osmosis. This increases the water pressore in the seive tube cells, which drives the solution of food towards the sink. At the sink end, the food is unloaded from the seive tube cells via active transport. The water also leaves the seive tube cells. As the water moves out, it results in a decreased pressore of water in the seive tubes which causes a mass flow from the higher pressore at the source to the now lowered pressore at sink. This is the process through which food is translocated in plants and (transported) sent to all the other parts of the plants for utilization and ~~storg~~ storage.

Weaker responses failed to write about the structure of phloem vessels and translocation of food. Some of them gave generalized description stating that food moves from leaves to all parts of the plant body. Few of them highlighted the preparation of food in plants. Some of them wrote about the structure and function of xylem vessels.
Example:


(1) First when roots absorbs water and minerals from soil.
(2) Then it is take to leaves through phloem.
(3) Phloem are rod shaped pipes which carry food only
(4) Then leaves make food through the process of photo-synthesis
(5) Then the food is transpalted to other parts of plant by phloem.
(6) When phloem take minerals from roots it takes a pressure to take it upwards.
(7) When phloem takes food from leaves it easily transpoit food.
(8) Taking minerals from root it is the mechanism of pressure flow.