Aga Khan University Examination Board

Notes from E-Marking Centre on SSC II Biology Examination May 2015

Introduction

This document has been produced for the teachers and candidates of SSC Part II (Class X) Biology. It contains comments on candidates' responses to the 2015 Secondary School Certificate (SSC-II) 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.

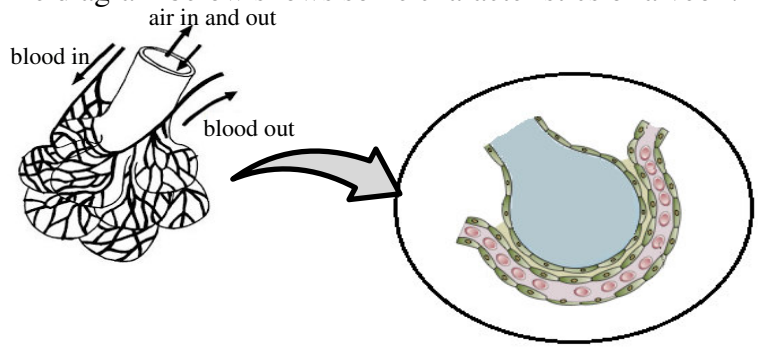
Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that requires candidates to respond by integrating knowledge, understanding and application skills they have developed during the course of study. Candidates are advised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

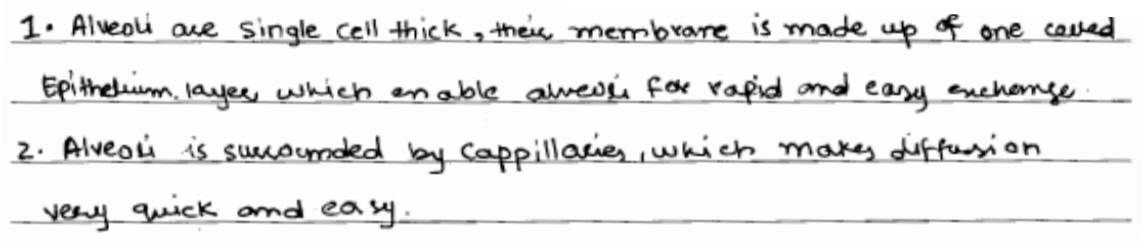
The diagram below shows some characteristics of alveoli.



Which TWO characteristics, visible in the diagram, enable alveoli to perform their function efficiently?

Better responses showed clear understanding of the stimulus-based questions. Such responses focused on the features of the alveoli given in the diagram that enable them to perform their function efficiently i.e. alveoli are richly supplied with blood capillaries/ alveoli have single-cell thick epithelium or thin epithelium. The characteristic, sac-like structure, was also accepted.

Example:


1. Alveoli are single cell thick, their membrane is made up of one celled Epithelium layer, which enable alveoli for rapid and easy exchange.
2. Alveoli is surrounded by cappillaries, which makes diffusion very quick and easy.

Weaker responses either wrote features of alveoli not visible in the diagram such as moist layer or features that were not related to the structure of alveoli. Other examples of weaker responses include: alveoli take blood and air into lungs/ right and left arteries and ventricles perform function in alveoli/ walls of alveoli are destroyed and it cannot come back to its original position/ cell wall is thick and semi-permeable/ high blood pressure in arteries/ alveoli is full of pus and the fluid/ walls of alveoli speed up diffusion/ walls of alveoli are quite broad/ alveoli have air spaces in between/ they remove waste products from the blood/ moist air and haemoglobin allow to perform its function efficiently.

Example:

Alveoli helps in gaseous exchange. It helps in exhalation and in inhalation. Alveoli helps blood to pass through it and if alveoli damaged the whole process of exchange of gases disturbed.

Question 1b

How do kidneys keep the composition of blood constant?

Better responses gave precise description of the role of kidneys to maintain blood composition normal. Such responses highlighted two main functions of kidneys, i.e. removal of excess water and salts from the blood while permitting selective reabsorption and removal of urea and other nitrogenous/ metabolic waste products from the blood.

Example:

Kidneys keep the composition of blood constant by filtering it. Through pressure filteration kidneys filter the water, salts and glucose etc from the blood. Then by selective reabsorption most of the water, salts and glucose are reabsorbed in the blood. It also secretes some ions and creatinines out of the blood To keep its PH normal. Excess of water, salt etc comes out of body in the form of urine.

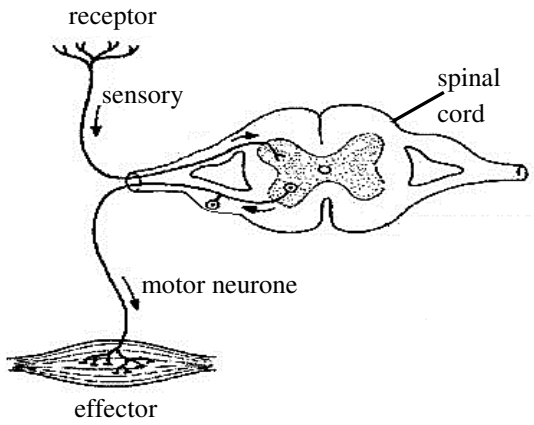
Weaker responses listed the steps of urine formation, i.e. ultrafiltration, selective reabsorption and secretion. Other responses wrote that kidneys keep the composition of blood constant by maintaining blood pressure/ maintaining composition of glucose/ keeping acid base concentration constant/ kidneys oxygenate blood and then carry it to the heart. One of the responses stated that kidneys have adrenal glands present; when there is less concentration of glucose in blood, it releases glucagon to bring blood concentration normal.

Example:

Kedney keep the blood composition constant by filtration the blood and excluding few components in the form of urine.

Question 2

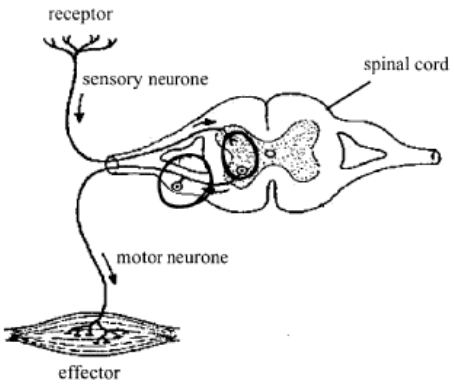
The diagram shows the path of a nervous impulse in case of a reflex action.



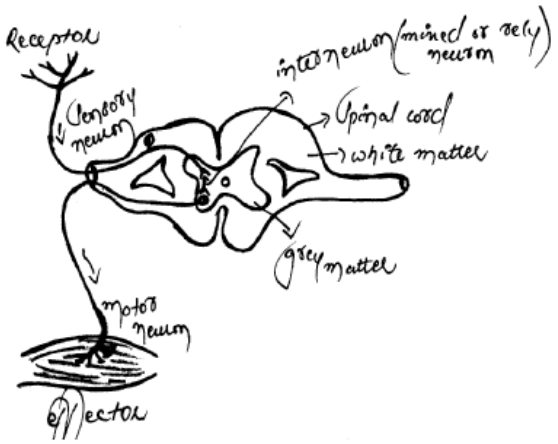
There are TWO errors (mistakes) in the diagram. Highlight these errors (mistakes) in the diagram using circles and redraw the correct diagram.

Better responses identified two errors in the diagram (incorrect position of dorsal root ganglion and missing relay neuron) and redrew the correct diagram.

Example:



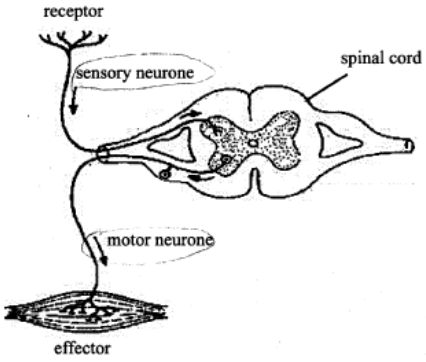
Highlighting Error



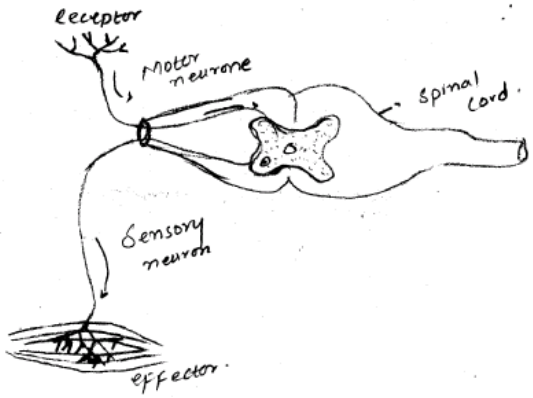
Showing Correction

Weaker responses failed to identify the errors in the diagram. They encircled receptor and effector as errors and interchanged their positions as correction. In one response, receptor was encircled as error and was drawn to the right side of the diagram as correction. Majority of the weaker responses redrew the diagram without highlighting any correction. One of the responses encircled both the arrows of motor neuron and reversed their direction. Another response relabelled sensory neuron and motor neuron as motor neuron and relay neuron respectively. Yet another relabelled sensory and motor neurons as receptor and effector neurons respectively.

Example:



Highlighting Error



Showing Correction

Question 3a

Categorize the following parts of the human skeleton as axial or appendicular.

rib cage	skull	pectoral girdle	vertebral column

Better responses categorised rib cage, skull and vertebral column as part of axial skeleton and pectoral girdle as part of appendicular skeleton.

Example:

Axial Skeleton	Appendicular Skeleton
Skull	Pectoral Girdle
Rib Cage	
Vertebral Column	

Weaker responses categorised vertebral column and rib cage as part of appendicular skeleton whereas pectoral girdle as part of axial skeleton. One of the responses described axial and appendicular skeleton. Another response mentioned jaws and arms as axial skeleton whereas sternum and hip as appendicular skeleton.

Example:

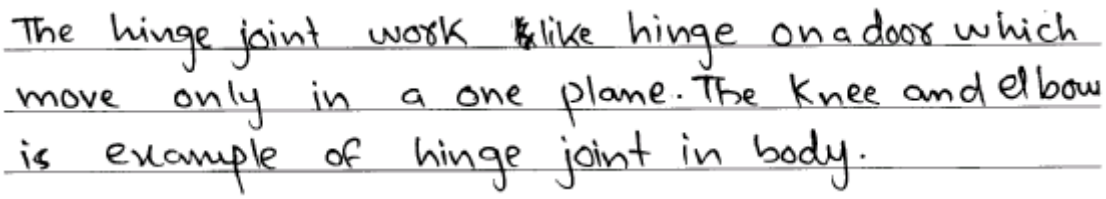
Axial Skeleton	Appendicular Skeleton
Axial skeleton consist of 80 bones.	Appendicular skeleton consist of 180 bones.
In which skull consist of 36 bones.	Rib cage consist of 80 bones
Pectoral girdle consist of 4 bones.	Vertebral column consist of 12 bones.
ear bone consist of 6 bones 3 in each ear.	ear bone consist of 6 bones 3 in each ear

Question 3b

How do hinge joints work? Give an example of a hinge joint present in the human body.

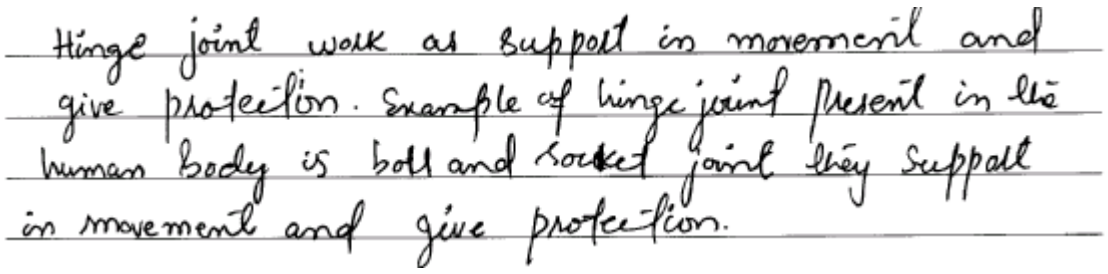
Better responses described the working of hinge joints that they move back and forth like the hinge on a door and allow movement in one plane only. They also provided examples of hinge joints such as knee joint or elbow joint.

Example:



Weaker responses stated that hinge joint helps to move or to take step, for example foot. Examples of other weaker responses include: it is a movable joint and its work is to move the hand/ it allows movement in all directions/ example is vertebral column/ it is an immovable joint e.g. skull/ hinge joint support in movement and give protection/ in hinge ligaments are present and tendons also present, synovial fluid is present which reduces friction/ it is a compact bone/ hinge joints are really sensitive/ they allow movement everywhere/ it is present on the top of the arms/ hinge joints work as ball and socket joints.

Example:

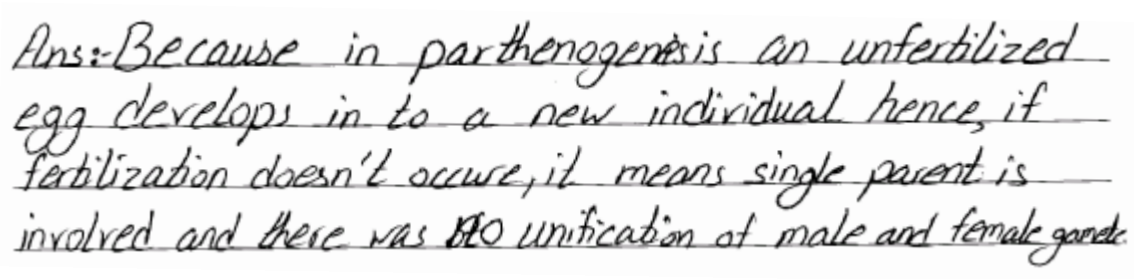


Question 4a

Why is parthenogenesis considered a type of asexual reproduction?

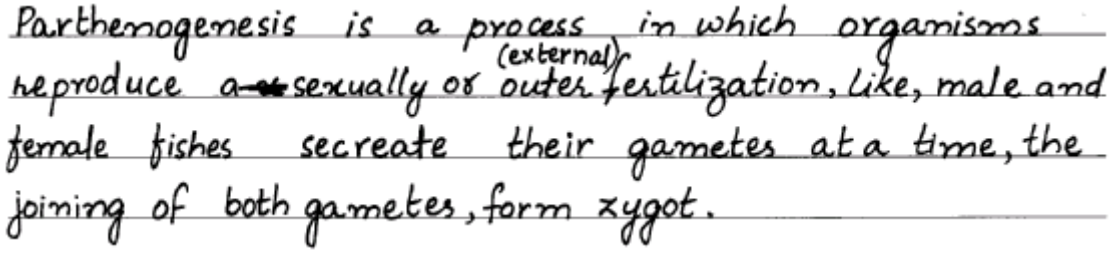
Better responses highlighted two features of parthenogenesis which make it a type of asexual reproduction, i.e. involvement of only one sex or parent and development of an embryo from an unfertilized egg cell.

Example:


Ans:- Because in parthenogenesis an unfertilized egg develops in to a new individual hence, if fertilization doesn't occure, it means single parent is involved and there was no unification of male and female gamete

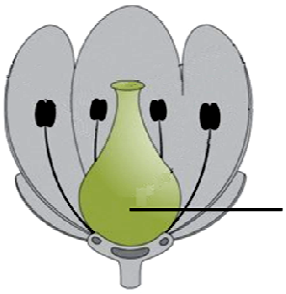
Weaker responses wrote that parthenogenesis is a type of asexual reproduction because in this fishes lay eggs and the queen honey bee lays eggs in haploid number/ organisms reproduce sexually or outer fertilization/ there is only one zygote and not two gametes/ it takes place in bacteria who live in colony/ in this type of fertilization most of the eggs are not fertilized while some are/ organism's body breaks into six to seven pieces and then those pieces are regenerated into new bodies/ we cut the organism from anywhere it grows itself in the new organism. It was observed that candidates were confused between parthenogenesis and external fertilization or regeneration.

Example:


Parthenogenesis is a process in which organisms reproduce ~~a~~ sexually or (external) outer fertilization, like, male and female fishes secreate their gametes at a time, the joining of both gametes, form zygot.

Question 4b

The given diagram shows a part of a flower labelled M. What role does it play in the formation of a fruit?



Better responses identified structure M as ovary and superficially described its role in fruit formation. Most of the candidates wrote about ovules turning into seed. None of the responses wrote about ovarian wall that it becomes fruit wall and is called pericarp. SLO 14.3.2 requires candidates to describe fruit formation.

Example:

The Given structure M (Ovary) contains ovule. After fertilization, the Ovules develop into seeds while the ovary develops into the fruit.

Weaker responses wrote that the part labelled as M contains macrospore female gametophyte generation/ it produces juice and fruit in the flowers/ it is stigma and it contains ovaries in it/ it is a female reproductive part/ the structure is ovule. Some responses described the process of fertilization and double fertilization in flowers. One of the responses wrote that ovary makes seeds while ovule turns into fruit.

Example:

It plays an important role in the formation of a fruit. It produces juice and fruit in the flowers and this production of juice and fruit attract many Honey bees, bird, butterflies etc.

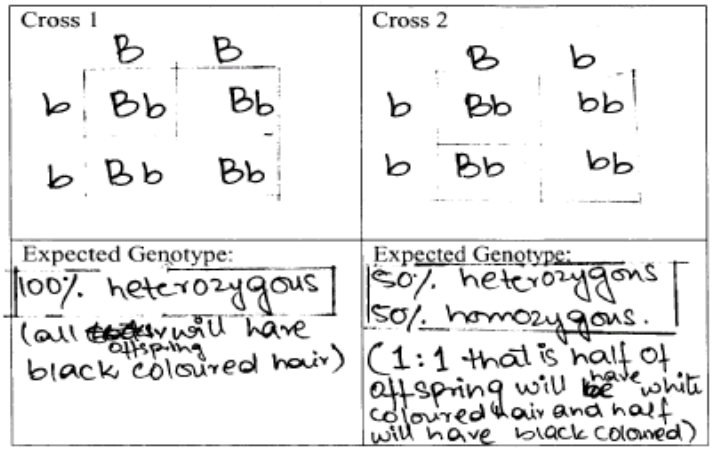
Question 5

A male black-haired cat is crossed with a female white-haired cat. Determine the expected genotypes of the offspring.

(Your answer should include working of both the possible crosses.)

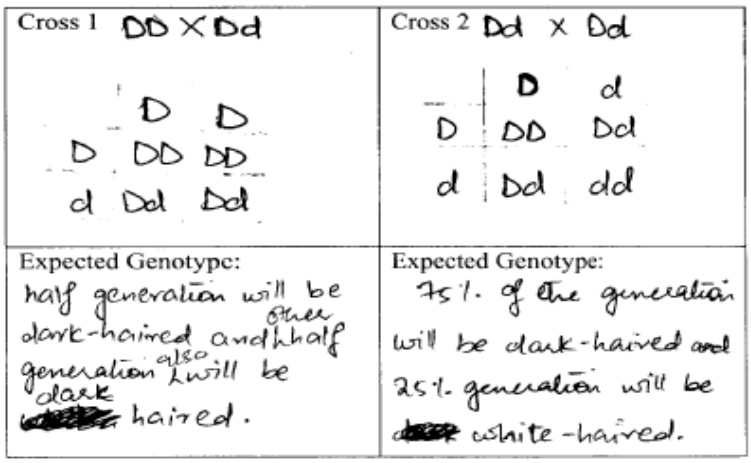
Better responses showed the working of two crosses using correct labels for traits given in the question, i.e. B and b. They also found out the expected genotype, i.e. 100% heterozygous black and 50% heterozygous black and 50% white in cross 1 and 2 respectively.

Example:



Weaker responses did not show working of the crosses and directly stated wrong percentages of black-haired and white-haired cats. Some of the responses stated the colour only, i.e. black. The question asked to determine the expected genotype which means besides mentioning colour, candidates should also mention the genetic makeup, i.e. heterozygous black or homozygous black. A few responses gave the ratio, i.e. 3:1, in both cases. One of the responses stated that some genes are from white-haired cat and some genes are from black-haired cat. In one response, cats were drawn to show the cross.

Example:

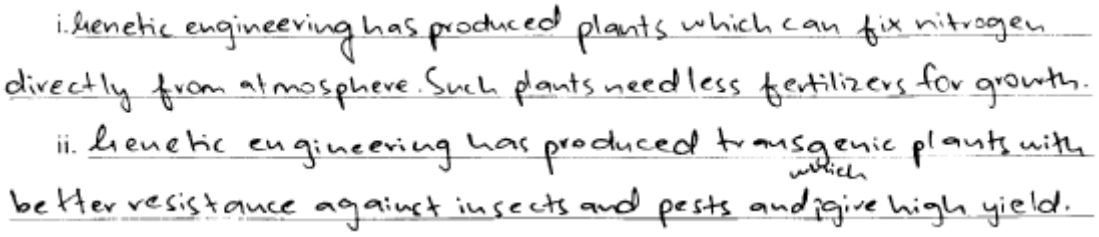


Question 6a

In what ways genetic engineering has benefited agriculture?

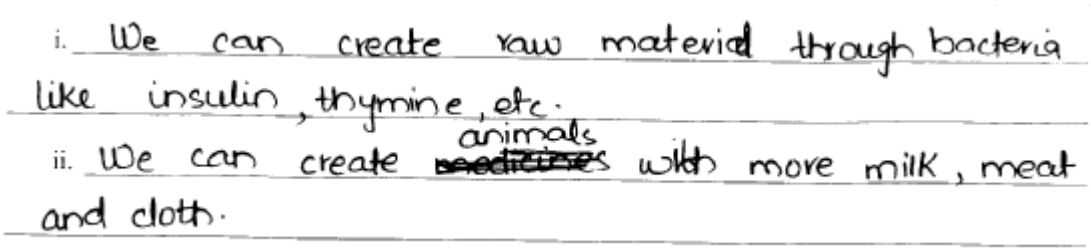
Better responses wrote the benefits of genetic engineering pertaining to agriculture only. For instance, scientists have developed pesticide/ insecticide/ herbicide resistant plants where plants are not affected by the chemical substances used to kill pests/ insects/ herbs and transgenic plants are known for high yields with desirable characteristics.

Example:



Weaker responses wrote about high meat, milk and cloth yield from animals or use of bacteria to produce insulin. A few responses wrote about the increased production of single-cell proteins. One response wrote about the isolation of genes and its insertion into vector. Other examples of weaker responses include: use of cutting and grafting technique/ production of more eggs/ production of non-seasonal crops/ use of urea as fertilizer.

Example:



Question 6b

Three persons Mr X, Y and Z are addicted to sedatives, narcotics and hallucinogens respectively. Write any TWO effects that can be observed on the metabolism of each individual.

Person	Addicted to	Effect on Metabolism
Mr X	Sedatives	
Mr Y	Narcotics	
Mr Z	Hallucinogens	

Better responses wrote the effects of each addictive drug on metabolism as follows:

Person	Addicted to	Effect on Metabolism
Mr. X	Sedatives	He would suffer from depressed central nervous system/ dizziness/ lethargy/ slow brain function/ depression.
Mr. Y	Narcotics	He would have ecstatic effects/ drowsiness.
Mr. Z	Hallucinogens	He would have changes in perception/ thought/ emotion and consciousness/ effected sympathetic nervous system/ dilated pupils/ constricted arteries and elevated blood pressure/ affect production of sperms/ increased heart rate.

Example:

Person	Addicted to	Effect on Metabolism
Mr X	Sedatives	It slows down the function of brain. It induces lethargy, dizziness and depression.
Mr Y	Narcotics	It also affects central nervous system. It produce feeling of delight. It increases the blood pressure. It reduce Pain.
Mr Z	Hallucinogens	It changes thought, emotion, perception. It dilates the pupil and blood pressure increases. It affects on parasympathic nervous system.

Weaker responses wrote general symptoms such as affect nervous system/ affect brain/ cause cancer/ affect lungs/ metabolism is improved/ stop brain functioning/ damage brain tissue/ less urine/ cause sleeplessness/ affect heart beat/ cause shivering. Others wrote same effect for all three types of addictive drugs, i.e. slow down metabolic rate.

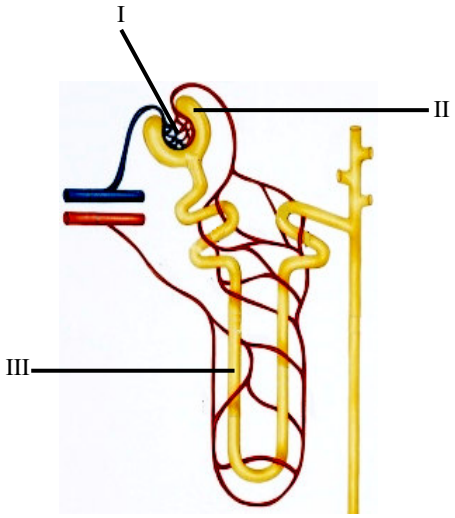
Example:

Mr X	Sedatives	decreases the effect
Mr Y	Narcotics	cause cancer
Mr Z	Hallucinogens	increases the effect

Extended Response Questions (ERQs)

Question 7a

What is the significance of structural adaptation to function? Describe how the structure of each labelled part of the nephron is related to its respective function.



Better responses wrote about the significance of structural adaptation to function, i.e. it helps the structure/ organ to perform its function efficiently/ competently. They described the structure of each labelled part in the diagram with reference to its adaptation and then correlated the adaptive feature with the function. For instance, structure I is a mass/ network of numerous blood capillaries thus it facilitates ultrafiltration or structure II is cup shaped which helps it to collect filtrate.

Example:

Significance of structural adaption to function: The organ works best if it is adapted to the function it has to do. For example lungs provide oxygen to blood and remove carbondioxide. Lungs are best adapted to this function. Lungs can't support in locomotion because they are not adapted. So, the better the structural adaption to a function will be, the better the efficeincy will be.

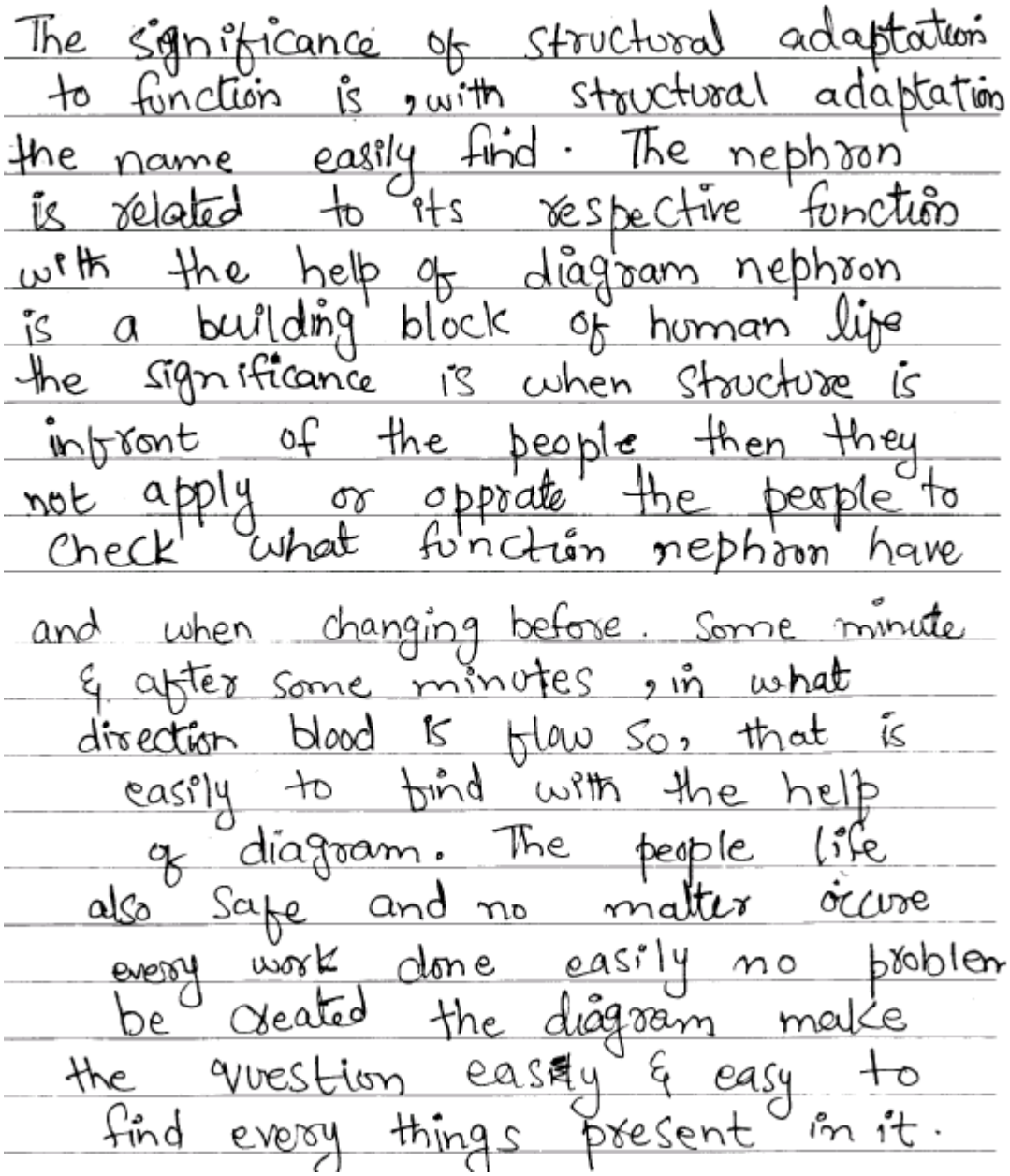
I: This is glomerulous. It has many small cappillaries closed and coiled to each other. It's function is to filter the blood. It filters the urea, uric acid, water, salts from the blood. It performs well due to many small capillaries with high blood pressure. Due to high blood pressure the blood is filtered as waste move out.

II: It is bowman's capsule. It has a cup shaped, circular structure. It's function is to collect the glomerular filtrate in it. Because of its structure is collects filtrate very easily.

III: It is the decending Loop of Henle. It has a tubular structure. It has blood capillaries around it. It's function is to re-absorb the water from the filtrate to the blood capillaries. It perfoms its function because it has a tubular structure with thin epithelial which helps in the movement of water.

Weaker responses only identified one or two parts of the nephron without describing their respective adaptions to perform efficiently. One of the responses wrote the steps as glomerulus filtrate, pressure filtration and tubular secretion and added that it help to purify blood and form urine. One weaker response described nephron with respect to its number, parts and shape. Other responses did not correlate the labelled structures (I, II and III) with their description. They described the structure of all the main parts labelled in the diagram. Few responses wrongly identified the structures, i.e. structure II as proximal convoluted tubule and structure III as collecting duct. One response wrote irrelevant description about structural adaptations only.

Example:


The significance of structural adaptation to function is, with structural adaptation the name easily find. The nephron is related to its respective function with the help of diagram nephron is a building block of human life the significance is when structure is infront of the people then they not apply or opprate the people to check what function nephron have and when changing before. Some minute & after some minutes, in what direction blood is flow so, that is easily to find with the help of diagram. The people life also safe and no matter occure every work done easily no problem be created the diagram make the question easily & easy to find every things present in it.

Question 7b

Define the term hormone. Describe the effects of vasopressin, calcitonin and thyroxin on the body metabolism when released in excess and in less than required amount.

Better responses defined the term hormone as a chemical substance which alters the activity of one or more target organs in the body/ specific messenger secreted by endocrine glands. They described the effect of hypo secretion and hyper secretion of vasopressin, calcitonin and thyroxin on the body metabolism. For instance, when vasopressin is released in excess amount more water is reabsorbed from nephrons as a result less urine is produced whereas when it is released in low amount less water is reabsorbed from nephrons and as a result more urine is produced.

Example:

A Hormone is a messenger molecule synthesized and secreted by an Endocrine gland. Endocrine glands are ductless glands which release their secretions directly into the blood stream:

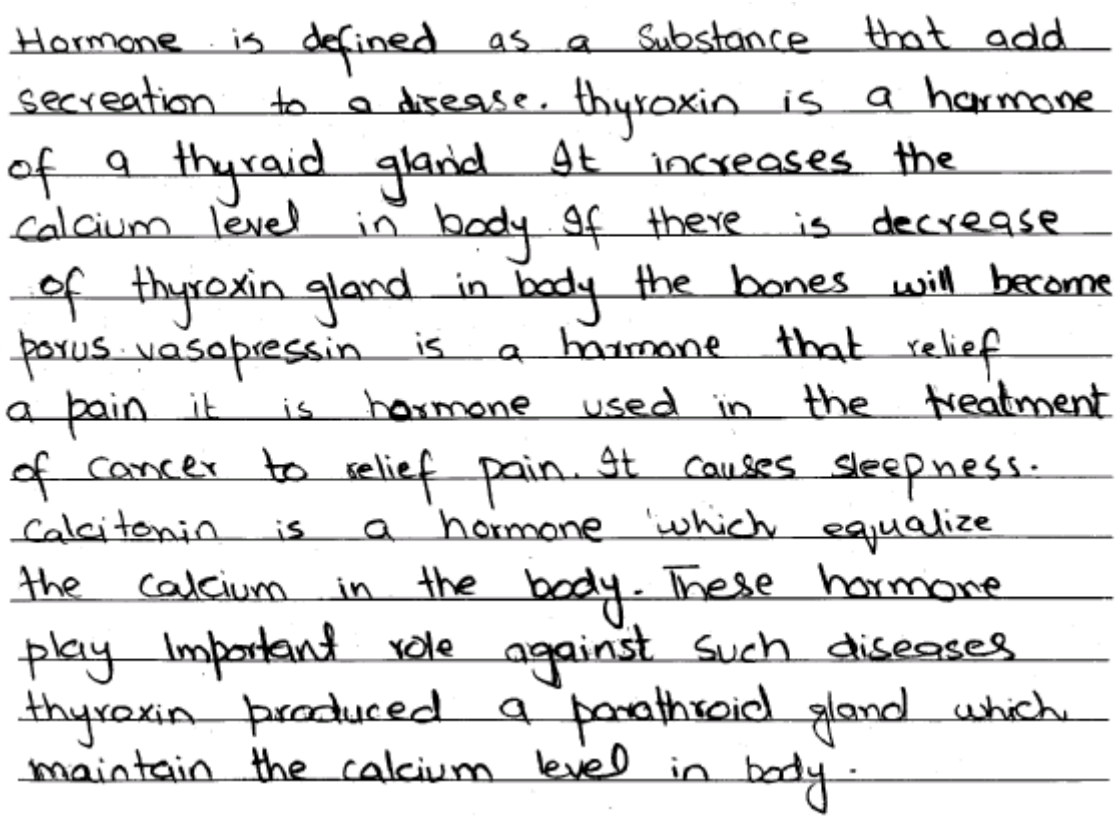
Vasopressin is a hormone produced by ~~the~~ the pitituary gland. It is necessary for the absorption of water from the capillaries. Hyper secretions (Excess secretions) of the vasopressin leads to more absorption of water from the capillaries while hypo secretions (less than required) ~~absorption~~ secretion leads to less absorption. Neither is beneficial for the body unless vasopressin is secreted in the required amount.

Calcitonin is the hormone responsible for the absorption of the calcium ions from blood into the bones. Hyper secretions of calcitonin results in more absorption of the calcium ions. While hypo secretions result in less absorption of calcium ions. Hypo secretion may result in weak bones or the density of the bones may increase.

Thyroxin is the hormone secreted by the thyroid gland. It is responsible for the metabolic rates in body of metabolism. less secretion or hypo secretions of the Thyroxin may result in decreased metabolic rate ~~While~~ of activities. Hyper secretions may result in ~~or~~ increased metabolic rate of activities.

Weaker responses wrongly defined hormones. Such responses wrote that hormones are those organisms which can be produced by different glands to treat infections in the body and other harmful bacteria and virus or hormone is defined as a substance that adds secretion to a disease. Other weaker responses mixed up the functions of hormones, e.g. thyroxin is a hormone of a thyroid gland, it increases the calcium level in the body and if decreased, bones will become porous. Candidates also seemed to be confused with the effect of hyper and hypo secretion of calcitonin. The function of calcitonin is to reduce blood calcium level thus promoting more calcium absorption by bones. If there is hypo secretion of calcitonin, the bones (specifically in children) will become brittle.

Example:

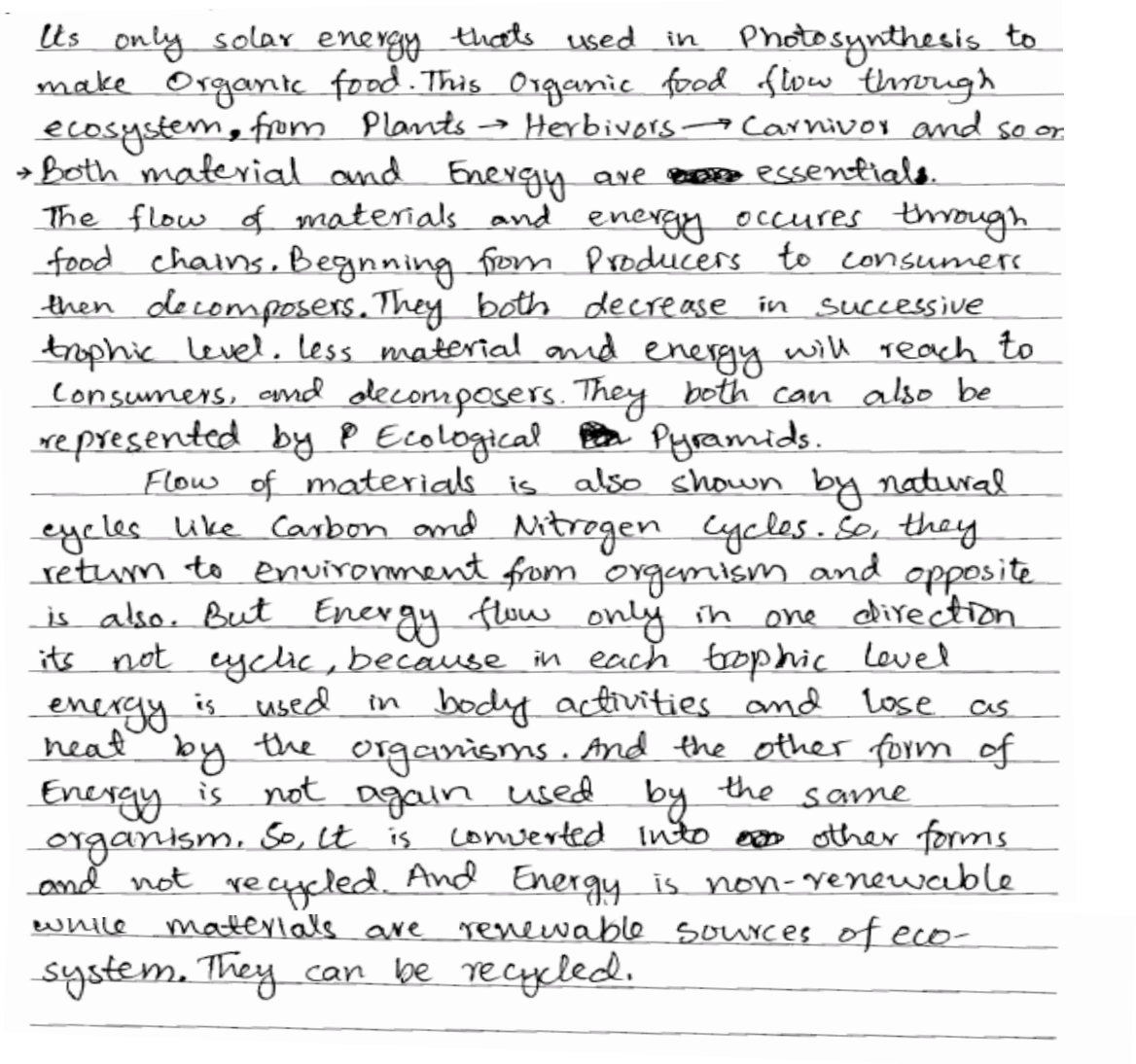

Hormone is defined as a substance that add secreation to a disease. thyroxin is a harmone of a thyraid gland It increases the calcium level in body If there is decrease of thyroxin gland in body the bones will become porus. vasopressin is a harmone that relief a pain it is harmone used in the treatment of cancer to relief pain. It causes sleepness. calcitonin is a hormone which equalize the calcium in the body. These harmone play Important role against such diseases thyroxin produced a parathroid gland which maintain the calcium level in body.

Question 8a

Why is sun considered to be the principle source of energy for all forms of life? Describe the ways in which the flow of material and the flow of energy in an ecosystem are similar and different.

Better responses described sun as the source of heat and light energy and the conversion of solar energy into other forms of energy. Such responses gave similarities between flow of material and flow of energy that both move from producer to primary consumer and so on. They described that plants capture energy from the sun; this energy, in the form of food, moves down the chain from one trophic level to another. While writing differences candidates wrote that flow of material is cyclic, i.e. plants make organic food which is consumed by other members of the food chain or food web. Ultimately, when the dead bodies of the organisms are decomposed, the soil is replenished with nutrients whereas flow of energy is non-cyclic, i.e. it is lost in the environment as heat.

Example:

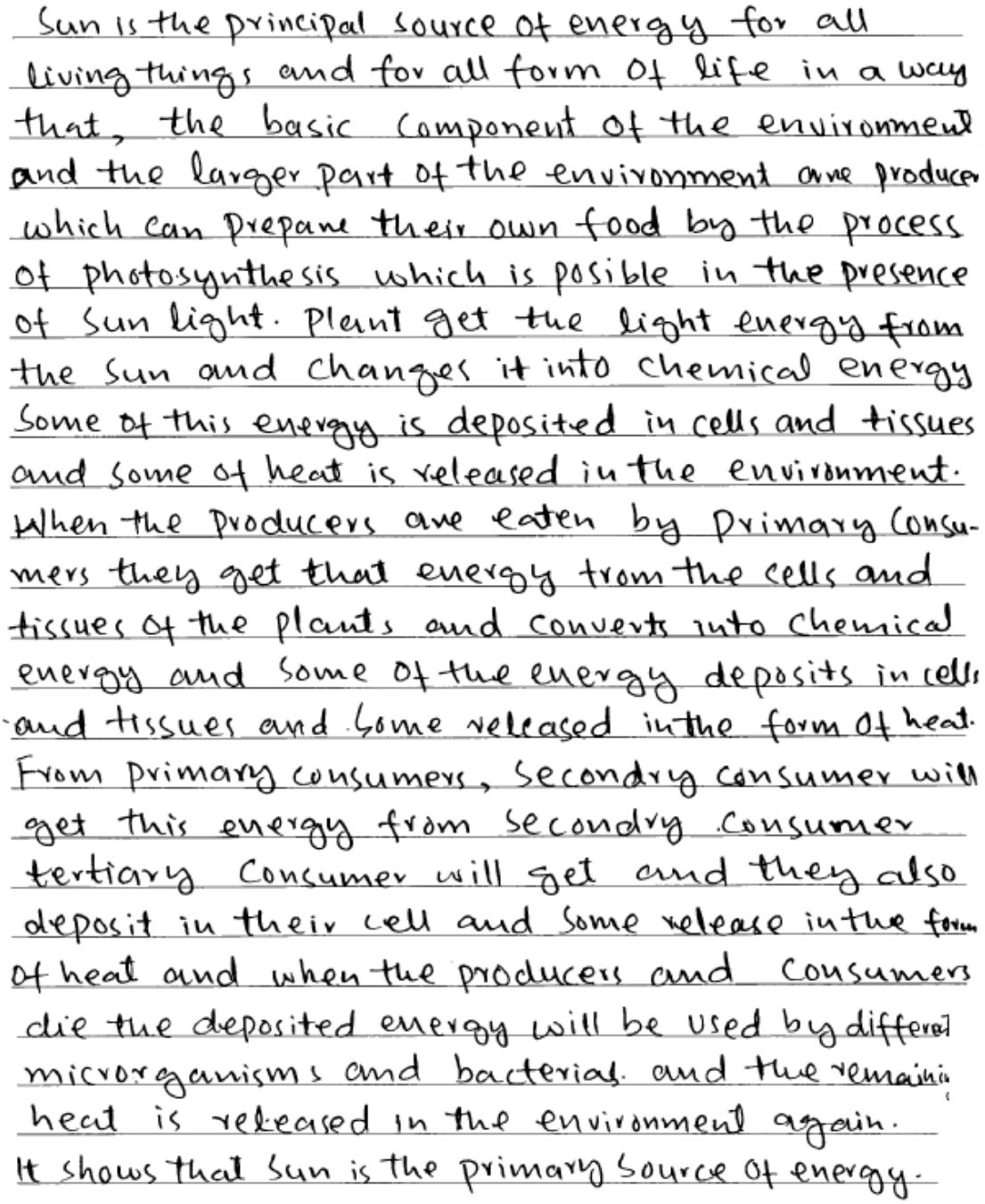


Its only solar energy thats used in Photosynthesis to make Organic food. This Organic food flow through ecosystem, from Plants → Herbivors → Carnivor and so on. Both material and Energy are essentials. The flow of materials and energy occures through food chains. Begnning from Producers to consumers then decomposers. They both decrease in successive trophic level. less material and energy will reach to consumers, and decomposers. They both can also be represented by P Ecological Pyramids.

Flow of materials is also shown by natural cycles like Carbon and Nitrogen Cycles. So, they return to environment from organism and opposite is also. But Energy flow only in one direction its not cyclic, because in each trophic level energy is used in body activities and lose as heat by the organisms. And the other form of Energy is not again used by the same organism. So, it is converted into other forms and not recycled. And Energy is non-renewable while materials are renewable sources of eco-system. They can be recycled.

Weaker responses described the concept of food chains. Candidates described the process of transfer of food and energy from producers to primary consumers, secondary consumers and tertiary consumers. They also described the role of bacteria and fungi in the food chains. Few responses described biotic and abiotic factors and their role in the ecosystem. One of the responses showed diagrams of pyramid of numbers and pyramid of biomass. A candidate wrote that flow of material and flow of energy are similar because both provide us light whereas both are different because flow of material work by the help of electricity, gases, batteries while flow of energy is a universal source, i.e. God-gifted.

Example:


Sun is the principal source of energy for all living things and for all form of life in a way that, the basic component of the environment and the larger part of the environment are producer which can prepare their own food by the process of photosynthesis which is posible in the presence of sun light. Plant get the light energy from the sun and changes it into chemical energy Some of this energy is deposited in cells and tissues and some of heat is released in the environment. When the producers are eaten by primary Consumers they get that energy from the cells and tissues of the plants and converts into chemical energy and some of the energy deposits in cells and tissues and some released in the form of heat. From primary consumers, secondry consumer will get this energy from secondry consumer tertiary Consumer will get and they also deposit in their cell and some release in the form of heat and when the producers and consumers die the deposited energy will be used by different microorganisms and bacterias. and the remaining heat is released in the environment again. It shows that sun is the primary source of energy.

Question 8b

Describe any TWO harmful effects of each, deforestation and acid rain, on plant and animal life.

Better responses wrote the effect of deforestation and acid rain on plant and animal life separately. Candidates first wrote about the effect of deforestation on plant life, i.e. loss of habitat or soil erosion or extreme temperature swings that can be harmful to plants. Subsequently, they wrote about the effect of deforestation on animal life, how it results in their extinction or endangerment. Similarly, they wrote about the effect of acid rain on plants, i.e. damaging plant leaves or hindering plant growth and on animals, i.e. toxicity or eutrophication or skin disorders.

Example:

DEFORESTATION is defined as the clearing away of lands by cutting down trees to use the land for various purposes. But deforestation has indeed drastic effects not only on environment but also on the plants and animal lives such as :-

1) Many animals including birds, chimpanzees etc live on trees. When trees are cut down, such organisms lose their habitats as a result.

2) There's an increase in the amount of CO_2 and decrease in the amount of O_2 which produces suffocation for animals since they do not get clean air to respire and same is the case with plants that they do not get O_2 for respiration. 3) Due to deforestation, there's a loss of plant species.

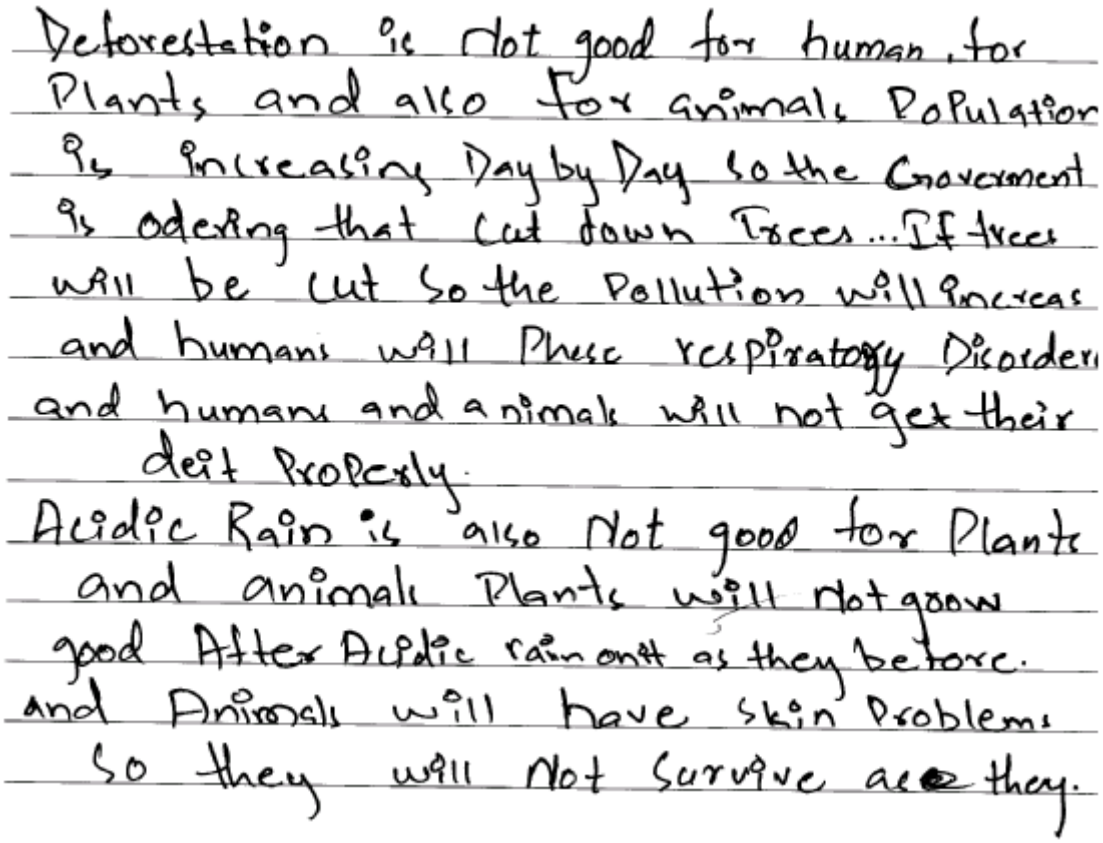
4) Lack of enough trees but presence of excess water increases the soil's water content hence producing waterlogging and making the soil unsuitable for future use.

ACID RAIN :- When the rain water mixes with the impurities of the atmosphere and showers down, it becomes acid rain because dissolved impurities decreases water pH hence making it acidic. This also effects the environment because :-

1) The acid rain when falls on the ground, it makes the soil acidic because it mixes with the harmful impurities and hence, the pH of soil decreases. This soil is unsuitable for the growing of new plants. 2) Acid rain contains compounds of Sulphur and Nitric which dissolves to form Sulphuric and Nitric acid which is extremely corrosive for skins of both, humans and animals. 3) The acid rain water, if used for irrigation, may get absorbed by the plants which are the main producers and hence, may enter food chain.

Weaker responses gave general effects of deforestation and acid rain on animal and plant life i.e. both will be extinct/ destroyed/ finished. A few responses wrote about air pollution that how deforestation can lead to environmental degradation. A candidate wrote that there would be no variety of plants as there were no cross pollination. Other responses displayed partial understanding about the demand of the question. Such responses, besides writing about plants and animals, described the effects of acid rain on buildings and monuments, i.e. calcium carbonate present in marble and lime stone affect buildings as a result they erode.

Example:


Deforestation is not good for human, for Plants and also for animals Population is increasing Day by Day so the Goverment is ordering that cut down Trees... If trees will be cut so the Pollution will increas and humans will Phese respiratory Disorders and humans and animals will not get their deit Properly.
Acidic Rain is also Not good for Plants and animals Plants will not grow good After Acidic rain on it as they before. and Animals will have skin Problems so they will Not Survive as they.