Aga Khan University Examination Board

Notes from E-Marking Centre on HSSC-II Biology Examination May 2019

Introduction

This document has been produced for the teachers and candidates of Higher Secondary School Certificate (HSSC-II) Part II Biology. It contains comments on candidates' responses to the 2019 HSSC-II examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

E-Marking Notes

This includes overall comments on candidates' performance on every question and *some* specific examples of candidates' 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 fulfill 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.

General Observations

Candidates who did not score well were mostly not able to understand the demand of the question, often missing out important information given in the stimulus or stem. Furthermore, use of scientific terminology and interpretation of unseen diagrams and graphs were also weak. Nevertheless, candidates outdid in questions without stimulus. However, there is still room for improvement. Mentioned below are few concepts that teachers need to focus and give candidates more drill and practice to have a strong grip.

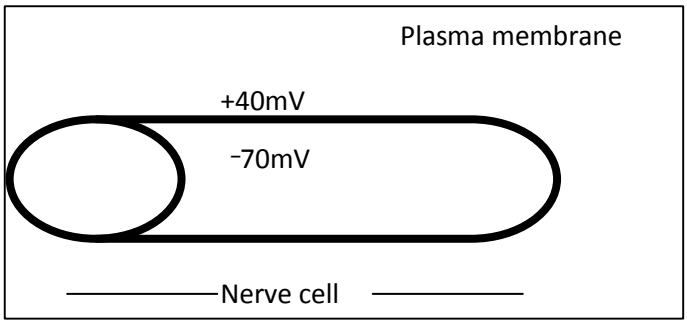
a. Protein synthesis i.e. Translation and role of release factor
b. Meiosis and gamete formation
c. Evolution
d. Role of loop of Henle in formation of concentrated urine

Detailed Comments

Constructed Response Questions (CRQs)

Question 1a:

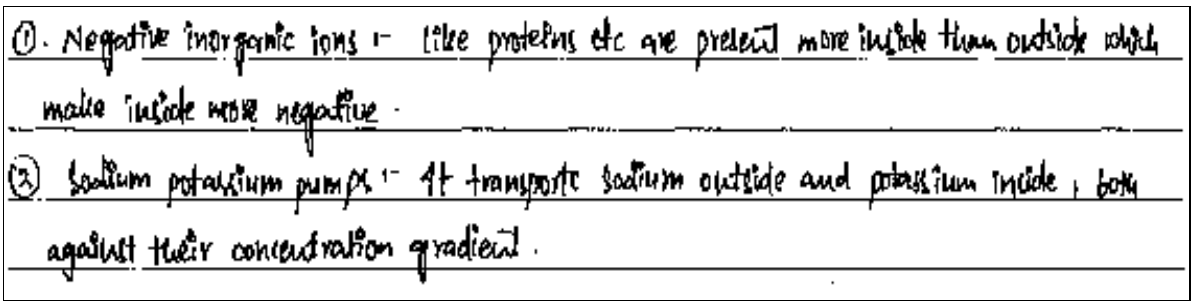
Potential difference across plasma membrane of an unstimulated nerve cell is shown in the given diagram.



Describe any TWO factors that are responsible for maintaining potential difference across the plasma membrane of a neuron.

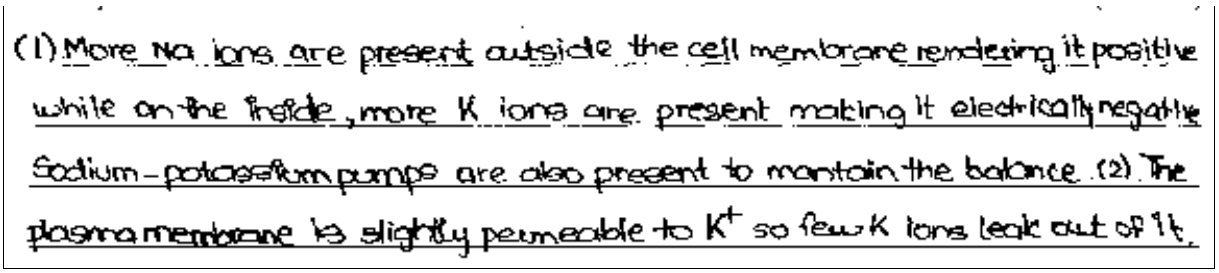
Better responses reflected wise use of the information given in the stem (diagram), thus, were able to correctly identify the potential difference. Moreover, such responses were successful to relate the given information with the relative concentration of sodium and potassium ions outside and inside membrane respectively mentioning the presence of ion gated channels and permeability of membrane for sodium and potassium ions.

Example 1:


(1). Negative inorganic ions :- like proteins etc are present more inside than outside which make inside more negative.

(2) Sodium potassium pump :- It transports sodium outside and potassium inside, both against their concentration gradient.

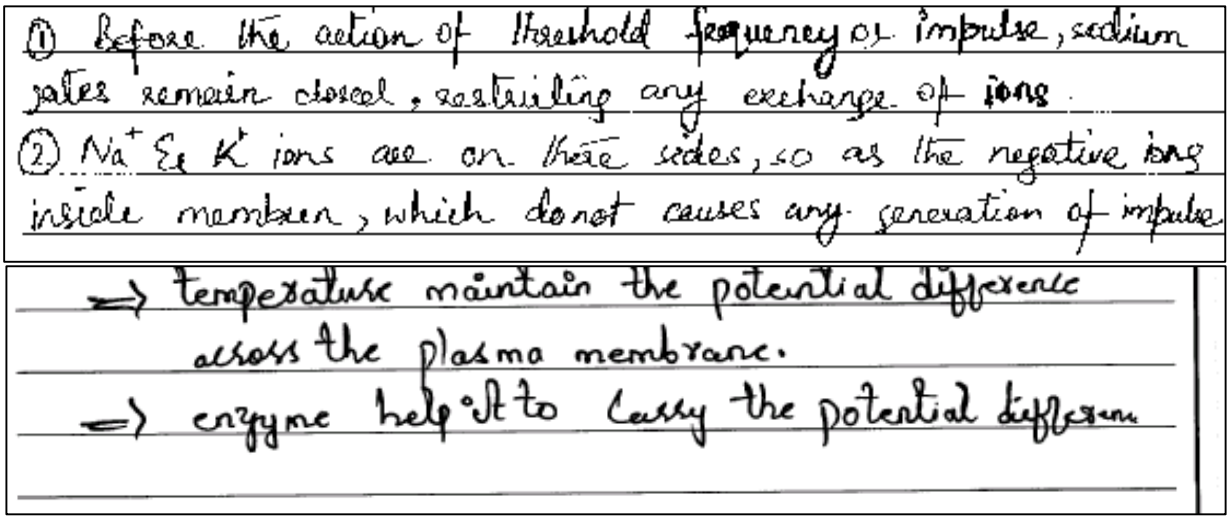
Example 2:


(1) More Na ions are present outside the cell membrane rendering it positive while on the inside, more K ions are present making it electrically negative Sodium-potassium pumps are also present to maintain the balance. (2) The plasma membrane is slightly permeable to K^+ so few K ions leak out of it.

Weaker responses exhibited carelessness in reading and understanding the information given in the stem (diagram). Such responses have mentioned generation of action potential or have described the factors affecting enzyme activity. Additionally, some candidates rephrased the given stem.

Candidates are advised to focus on the information provided in the stimulus before drafting their responses.

Example 2:



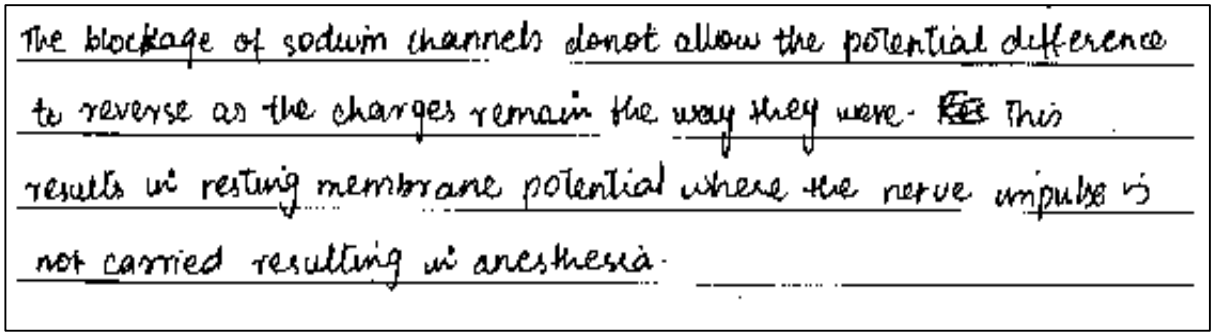
Question 1b:

Procaine is used to cause insensitivity to pain during dental surgeries. This drug acts by blocking the opening of voltage gated sodium channels in the neurons.

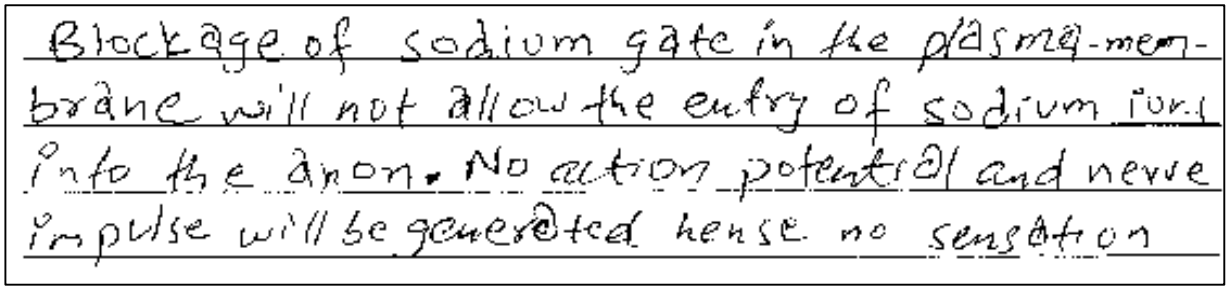
How does blockage of sodium channels cause anaesthesia (in-sensation)?

Better responses reflected wise use of the information given in the stem. Thus, were able to correctly describe the consequence of blocked sodium channels relating it to the normal process of action potential. Moreover, such responses were successful to relate the given information with the generation of nerve impulse.

Example 1:


The blockage of sodium channels donot allow the potential difference to reverse as the charges remain the way they were. This results in resting membrane potential where the nerve impulse is not carried resulting in anesthesia.

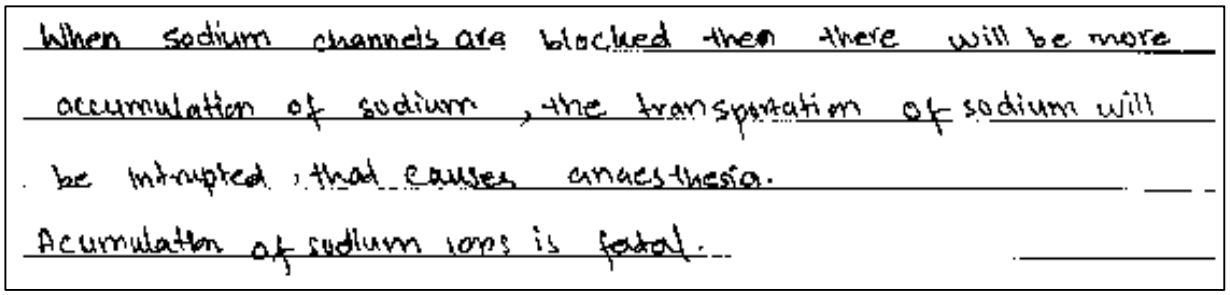
Example 2:


Blockage of sodium gate in the plasma-membrane will not allow the entry of sodium ions into the axon. No action potential and nerve impulse will be generated hense no sensation

Weaker responses were not able to use the stimulus intelligently. Such responses identified features that are irrespective of the given condition.

Candidates are advised to carefully focus on the given stimulus before drafting their answers. Furthermore, candidates explained the working of sodium potassium pump in maintenance of resting potential without relating it to anesthesia.

Example 1:


When sodium channels are blocked then there will be more accumulation of sodium, the transportation of sodium will be interupted, that causes anaesthesia.
Acumulation of sodium ions is fatal.

Example 2:

When K^+ ions diffuse out of the neuron as they are permeable to the membrane then the sodium and potassium gates open and for every three Na^+ moving outs of the neuron 2 K^+ comes inside the membrane to maintain potential difference but when the drug is used sodium channels becomes blocked and thus no Nations can move out therefore it disturbing the membrane potential and cause anaesthesia.

Question 2:

Complete the table by mentioning the location of the development of an embryo and its source of nourishment in each type of animals.

Type of Animals	Location of Development	Source of Nourishment
Oviparous Animals		
Viviparous Animals		

Better responses correctly named the location of development of an embryo in both oviparous and viviparous animals and similarly, their source of nourishment respectively.

Example:

Type of Animals	Location of Development	Source of Nourishment
Oviparous Animals	outside the womb of mother inside the shell of egg	through yolk enbyo get nourishment
Viviparous Animals	inside the womb of mother	through Placenta fetus get nourishment

Weaker responses were mostly unable to mention the correct source of nourishment for oviparous and viviparous animals. Furthermore, the source of nourishment in viviparous animals was given as umbilical cord which is only the connection between foetus and placenta of mother not the source of nourishment, and albumin as source of nourishment for oviparous animals which showed the misconception of candidates. It also frequently appeared that candidates named location of development and source of nourishment of oviparous animals in the boxes of viviparous animals and vice versa. Candidates are advised to be vigilant while drafting their answers.

Example 1:

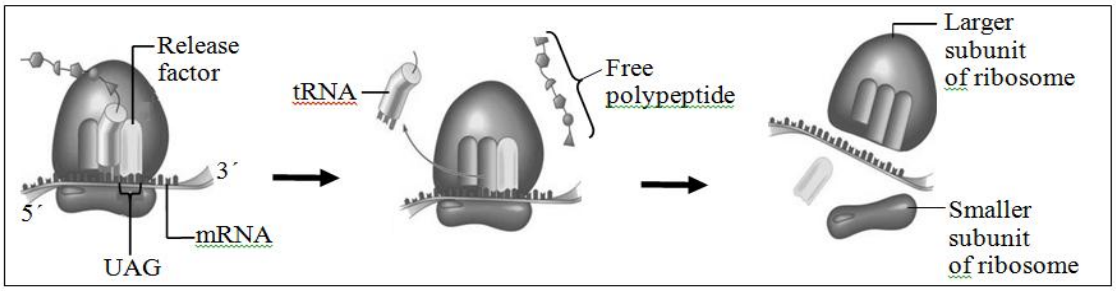
Type of Animals	Location of Development	Source of Nourishment
Oviparous Animals	fertilization is internal. inside the female body.	Inside the body of mother.
Viviparous Animals	fertilization is external Outside the female body.	Source of nourishment comes from external environment.

Example 2:

Type of Animals	Location of Development	Source of Nourishment
Oviparous Animals	Inside mother's body.	mother's placenta.
Viviparous Animals	Inside hard shelled egg.	from albumen of egg

Question 3:

The given diagram represents one of the steps of protein synthesis.



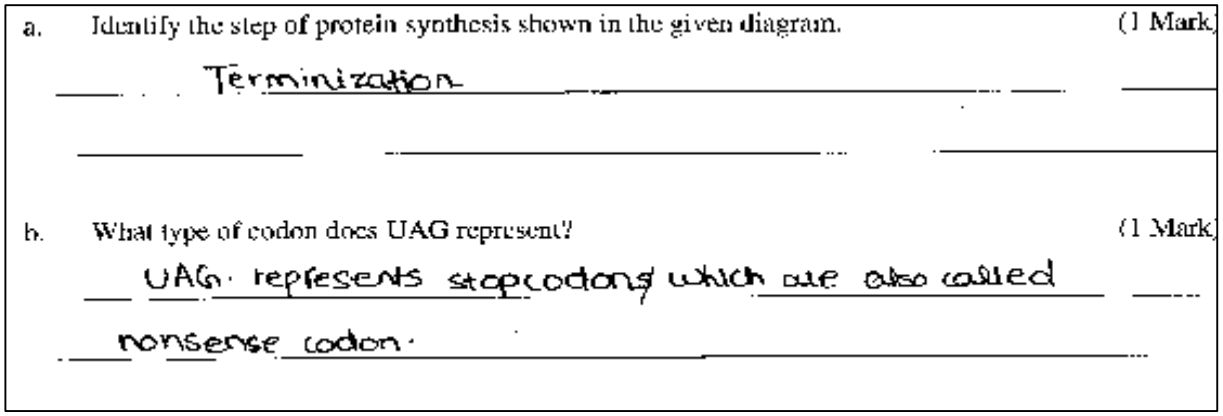
a. Identify the step of protein synthesis shown in the given diagram.

b. What type of codon does UAG represent?

c. Describe the role of release factor.

Better responses displayed clear understanding of the stem (diagram) by identifying the correct step of protein translation such as termination furthermore they correctly identify the stop or non-sense codon. Such responses correctly mentioned the role of release factor in the process of protein translation.

Example 1:

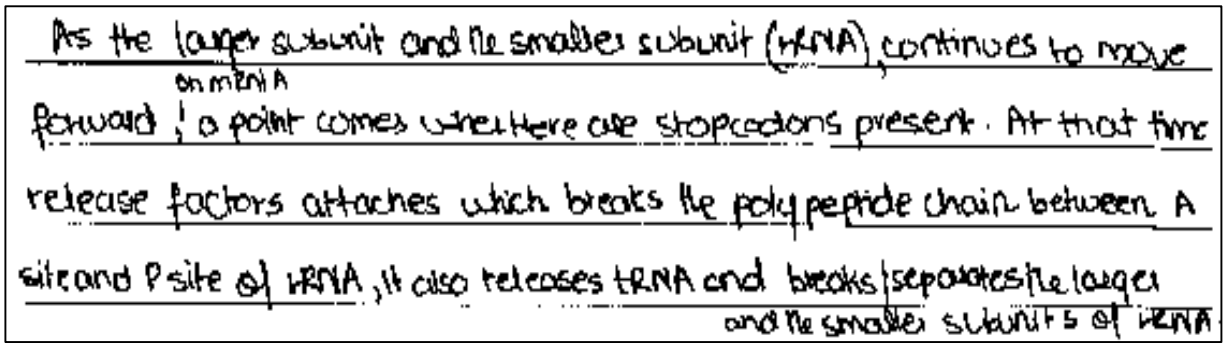

a. Identify the step of protein synthesis shown in the given diagram. (1 Mark)

Terminization

b. What type of codon does UAG represent? (1 Mark)

UAG represents stopcodons which are also called nonsense codon.

Example 2:


As the larger subunit and the smaller subunit (rRNA) on mRNA continues to move forward, a point comes where there are stopcodons present. At that time release factors attaches which breaks the polypeptide chain between A site and P site of rRNA, it also releases tRNA and breaks/separates the larger and the smaller subunits of rRNA.

Weaker responses drafted generalized answers by stating protein synthesis only. Such responses did not identify the stop codon correctly instead they identify it as start codon or have just written the full form of codon i.e. uracil, adenine and guanine. These responses were unable mostly to describe the role of release factor in the process of protein translation. Such responses did not meet the demand of the question; therefore, were unable to gain full marks. Candidates are highly recommended to understand the demand of the question by focusing on the command word and stem.

Example 1:

a. Identify the step of protein synthesis shown in the given diagram. (1 Mark)

Step 3 is the protein synthesis

b. What type of codon does UAG represent? (1 Mark)

It is the starting Codon.

release factor helps to mark space for the upcoming unit.

Example 2:

Transfer of genetic information.

b. What type of codon does UAG represent? (1 Mark)

U = uracil, A = Adenine, G = Guanine. which will Attach to the AUC

- The role of the release factor is to verify the information of the MRNA
- Realease factor also plays role in the binding of the MRNA if it has required Genetic info like :- UAG will bind to AUC

Question 4a

Normal Condition of Joint	Diseased Condition of Joint

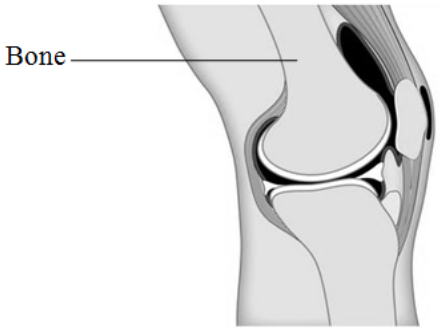
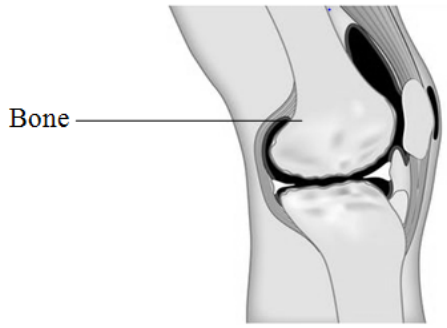

	

Diagram **I**	Diagram **II**

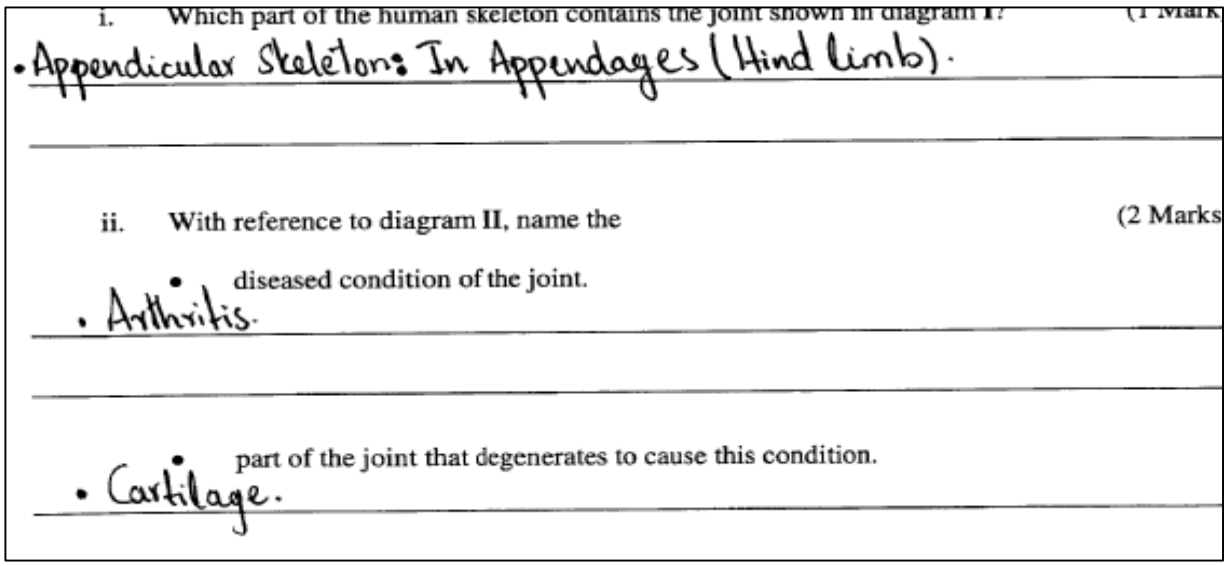
i. Which part of the human skeleton contains the joint shown in diagram **I**?

ii. With reference to diagram **II**, name the

- diseased condition of the joint.
- part of the joint that degenerates to cause this condition.

Better responses wisely used the information given in the stem (diagram) to identify the part of skeleton containing the joint. Furthermore, such responses highlighted the name of diseased joint and also correctly named the part of joint that degenerates. These responses exhibited the candidates' better understanding of structure of synovial joints.

Example 1:



i. Which part of the human skeleton contains the joint shown in diagram I? (1 Mark

• Appendicular Skeleton: In Appendages (Hind limb).

ii. With reference to diagram II, name the (2 Marks

• diseased condition of the joint.

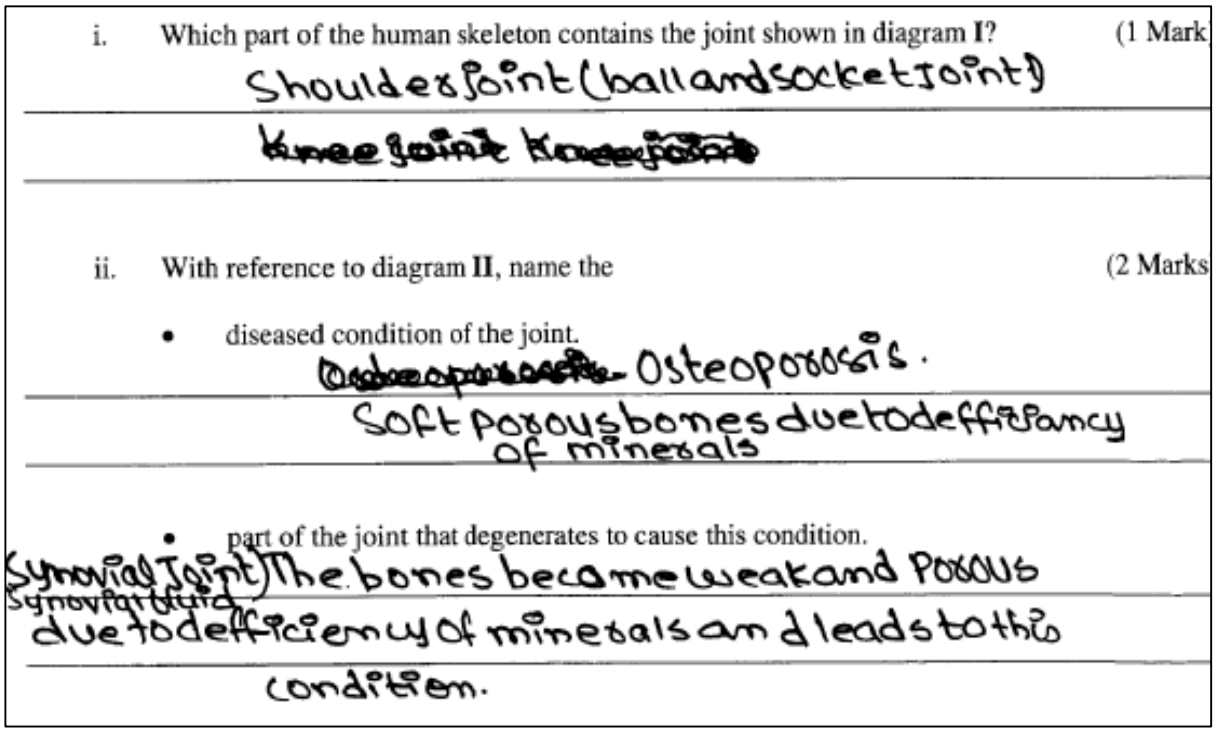
• Arthritis.

• part of the joint that degenerates to cause this condition.

• Cartilage.

Weaker responses revealed that the candidates have not focused on the stem and lead in question properly. Most of the responses have mentioned the type of joint in part (i) while the question was about part of skeleton. Furthermore, in the second part they have mentioned the disease of bones while the question was about the disease of joint. The second last part of responses also revealed candidates' poor understanding of structure of moveable joints and carelessness in reading the question properly.

Example 1:



i. Which part of the human skeleton contains the joint shown in diagram **I**? (1 Mark

Shoulder joint (ball and socket Joint)

Knee joint Knee joint

ii. With reference to diagram **II**, name the (2 Marks

- diseased condition of the joint.

Osteoporosis - Osteoporosis.

Soft porous bones due to deficiency of minerals

- part of the joint that degenerates to cause this condition.

Synovial Joint) The bones became weak and porous

Synovial fluid

due to deficiency of minerals and leads to this condition.

Example 2:

Axial skeleton contain the joint shown in diagram I.

ii. With reference to diagram **II**, name the (2 Marks)

- diseased condition of the joint.

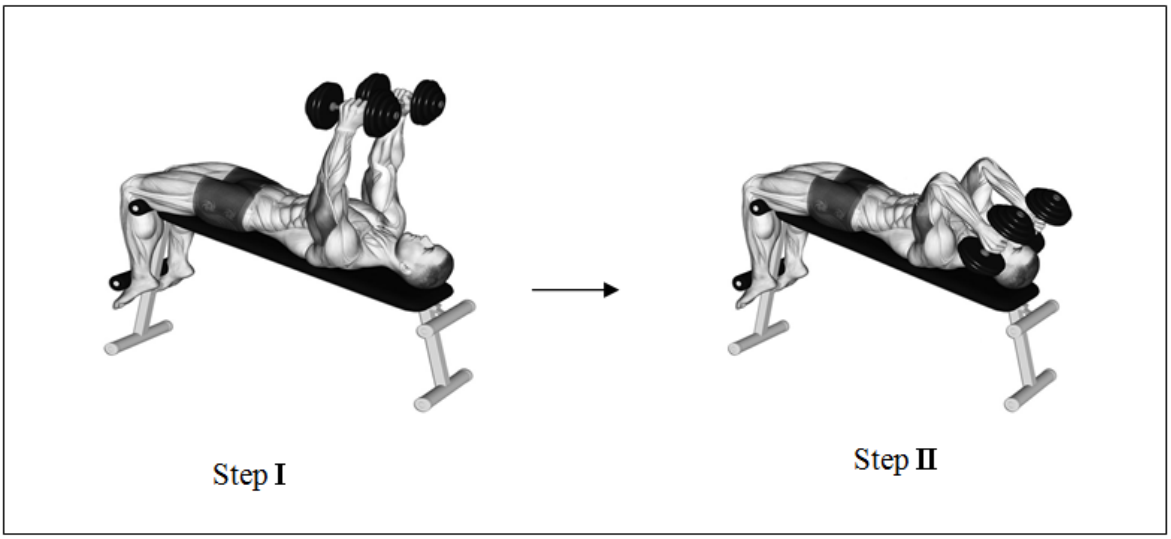
The joint has been unabled to freely move the bones.

- part of the joint that degenerates to cause this condition.

The space between the two bones is responsible for degenration.

Question 4b:

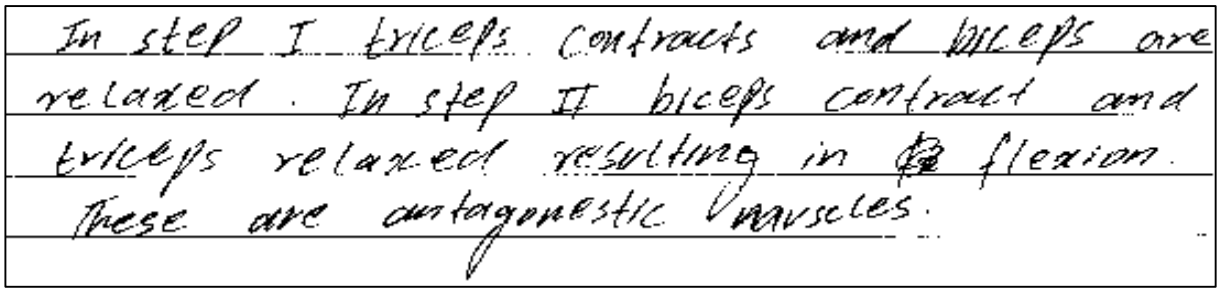
The given diagram represents a type of exercise.



Describe the movement of upper arm muscles from step **I** to **II** of the given exercise.

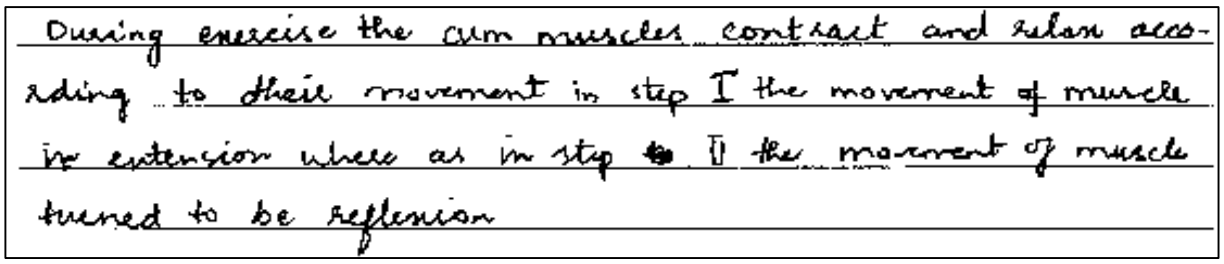
Better responses correctly mentioned the name of the muscles in upper arm i.e. biceps and triceps along with their antagonistic function. Such responses included the working of these muscles during extending and bending of arm.

Example 1:

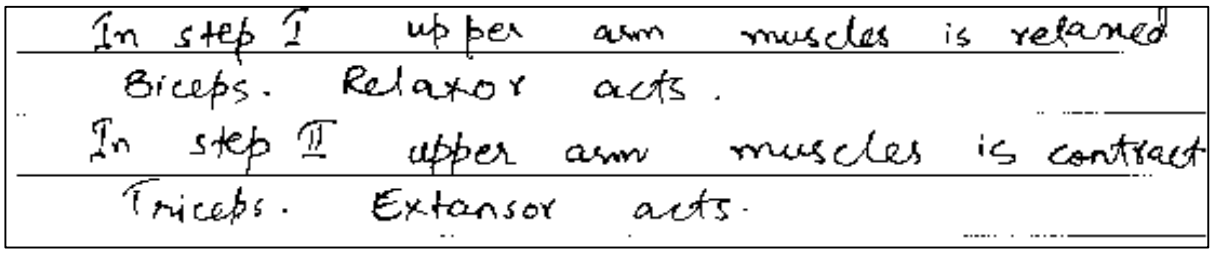

In step I triceps contracts and biceps are relaxed. In step II biceps contract and triceps relaxed resulting in flexion. These are antagonestic muvscles.

Weaker responses mentioned generalised and vague answers such as upper arm muscles contract and relax without specifying the names of muscles and their antagonistically working. Some responses mentioned incorrect position and working of bicep and triceps with reference to the given diagram.

Example 1:


During exercise the arm muscles contract and relax according to their movement in step I the movement of muscle is extension where as in step II the movement of muscle turned to be reflexion

Example 2:

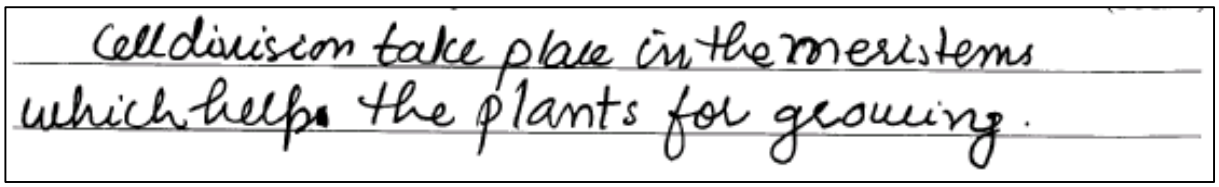

In step I upper arm muscles is relaxed
Biceps. Relaxor acts.
In step II upper arm muscles is contract
Triceps. Extensor acts.

Question 5a:

What is the role of meristem in plants?

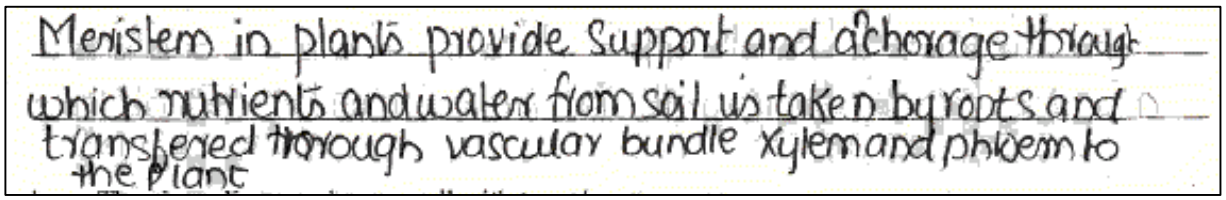
Better responses clearly stated the role of meristem in plants such as cell division, primary and secondary growth reflecting better understanding of the concept.

Example:



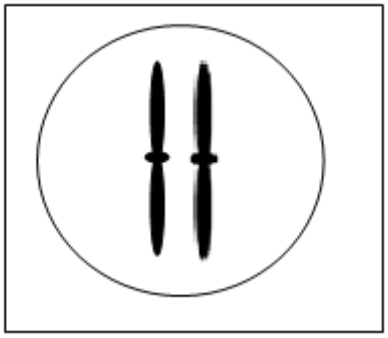
Weaker responses mentioned features of vascular tissues in place of meristematic tissues. Such responses did not meet the demand of the question; therefore, were unable to gain full marks.

Example 1:



Question 5b:

The given diagram shows a cell with two chromosomes.

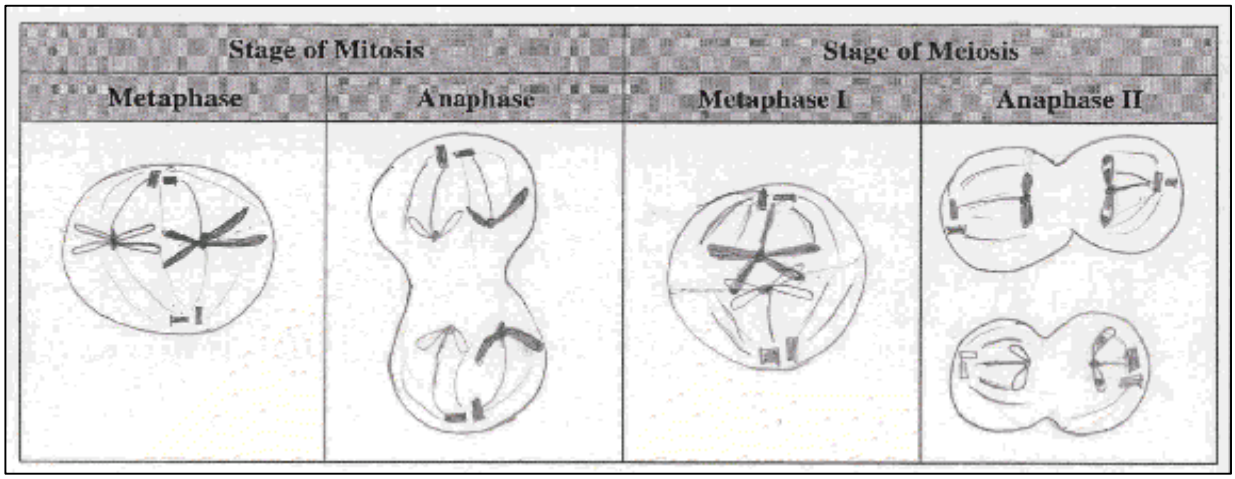


Illustrate the condition of chromosomes in the given stages of mitosis and meiosis.

Stage of Mitosis		Stage of Meiosis	
Metaphase	**Anaphase**	**Metaphase I**	**Anaphase II**

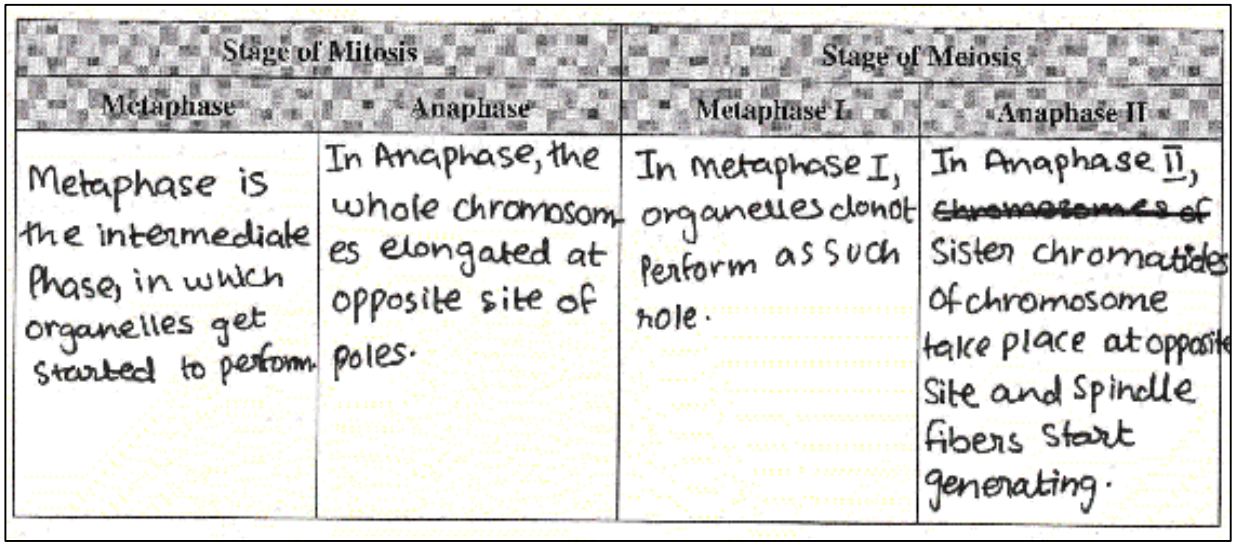
Better responses exhibited clear understanding of the command word i.e. illustrate and the concept of mitosis and meiosis as well. Such responses mentioned the correct position of chromosomes at equatorial plane during metaphase of mitosis and in metaphase I of meiosis also showed the pairing of homologous chromosomes.

Moreover, these responses clearly showed the pulling of chromosomes at opposite poles and correct number of chromosomes in anaphase of mitosis. Furthermore, these responses have mentioned the crossing over and haploid number of chromosomes in anaphase II of meiosis.

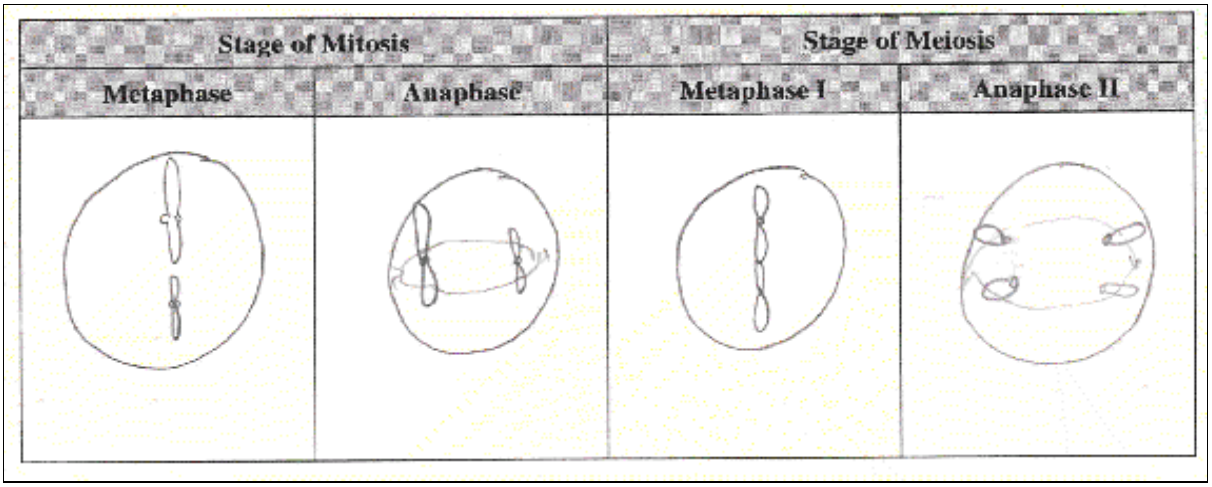


Weaker responses failed to understand the lead in question. These responses did not include any illustrations failed to fulfill the demand of question. However, in some responses, it was observed that candidates wrongly illustrate the stages of mitosis and meiosis neither mentioning the correct position nor the number of chromosomes. Most of the responses have not included the crossing over in stages of meiosis which is the characteristic feature of meiosis.

Example 1:



Example 2:



Question 6a:

Mr Ali is heterozygous for free earlobes and dark hair colour. Genotypically this can be represented as EeDd.

Mention all the possible gametes that he can produce?

Better responses correctly mentioned the four correct possibilities revealing the clear understanding of meiosis and gamete formation.

Example 1:

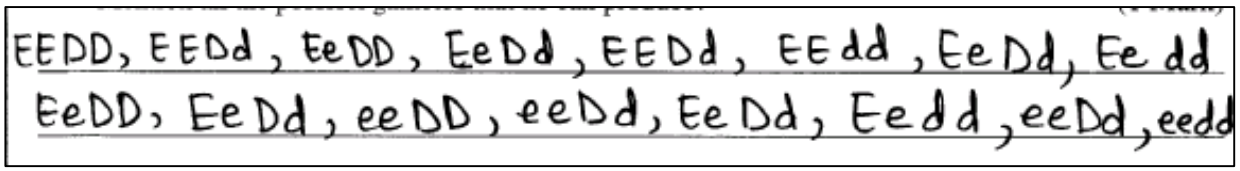
ED, Ed, eD, ed these are the four possible gametes which can be produced.

Weaker responses showed apparent lack of understanding of the concept of meiosis and gamete formation. Moreover, most of the candidates struggled to mention the correct combination and even showing the haploid condition in gametes.

Example 1:

He can Produce (E), (e), (D), (d) type of gametes.

Example 2:

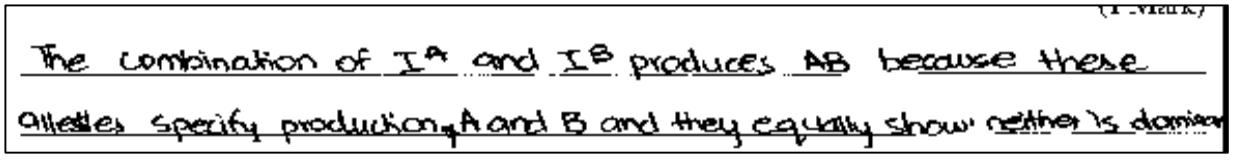


Question 6b:

Why does the combination of alleles I^A and I^B result in the production of blood group AB?

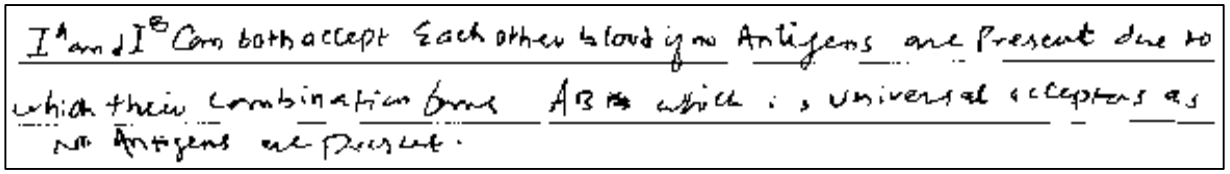
Better responses manifested candidates' capability to relate understanding of the combination of two different alleles for the same trait. Such responses stated the correct reason by mentioning the phenomenon of co-dominance in the production of blood group AB.

Example 1:



Weaker responses revealed candidates' carelessness in reading the question, which led to misinterpretation of the given question. These responses could not relate the combination of alleles with the production of blood group AB instead they linked the concept with antigens found on red blood cells used to classify blood groups.

Example 1:

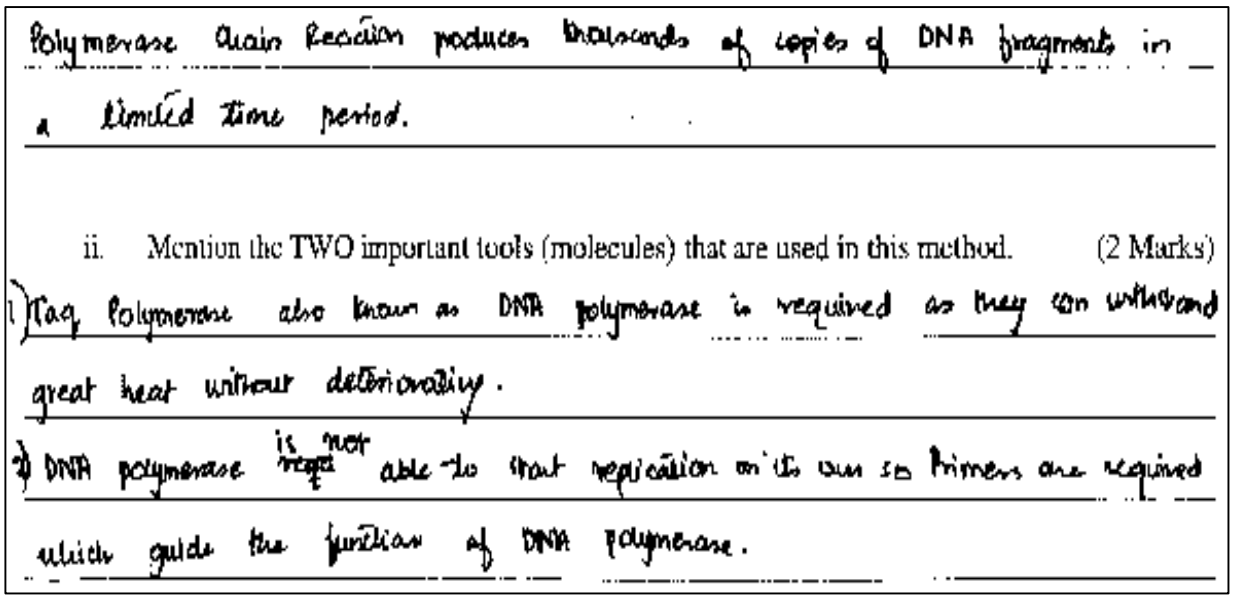


Question 6c:

i. Name the most efficient method that produces large number of copies of DNA fragments in limited time period.
ii. Mention the TWO important tools (molecules) that are used in this method.

Better responses correctly mentioned the method that is only polymerase chain reaction commonly called as PCR in the first part of the question. These responses also correctly mentioned the tools used in PCR asked in the second part of the question, revealing better understanding of the concept by the candidates.

Example:


Polymerase chain Reaction produces thousands of copies of DNA fragments in a limited time period.

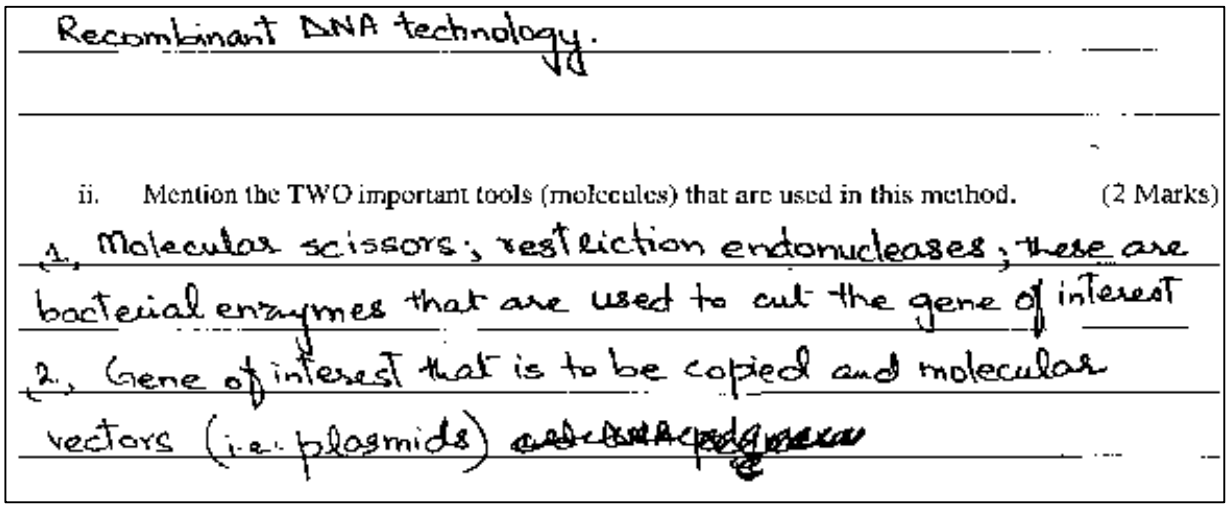
ii. Mention the TWO important tools (molecules) that are used in this method. (2 Marks)

1) Taq Polymerase also known as DNA polymerase is required as they can withstand great heat without deterioration.

2) DNA polymerase is not able to start replication on its own so Primers are required which guide the function of DNA polymerase.

Weaker responses exhibited vagueness in naming and mentioning the tools of PCR. Furthermore, most of the candidates named and described the method of genetic engineering or recombinant DNA technology. This also revealed the candidates' weaker concepts in understanding of the PCR method.

Example:


Recombinant DNA technology.

ii. Mention the TWO important tools (molecules) that are used in this method. (2 Marks)

1. Molecular scissors; restriction endonucleases; these are bacterial enzymes that are used to cut the gene of interest

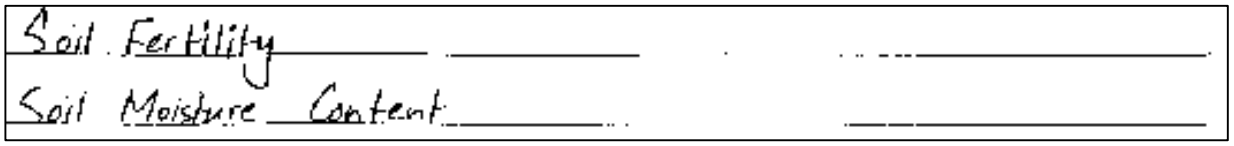
2. Gene of interest that is to be copied and molecular vectors (i.e. plasmids)

Question 7a:

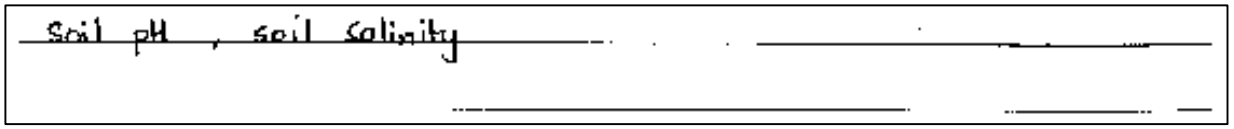
Name any TWO edaphic factors of biomes.

Better responses correctly named the edaphic factors, revealing better understanding of the concept by candidates. The candidates have awarded full marks for mentioning two correct edaphic factors.

Example 1:

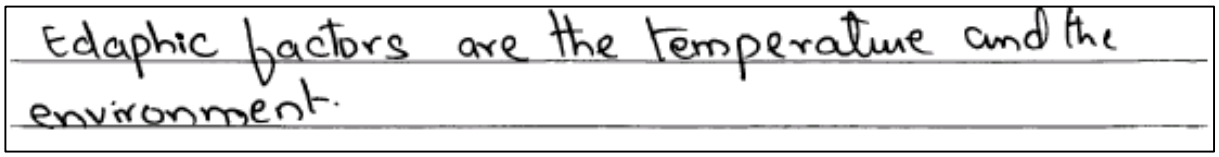


Example 2:

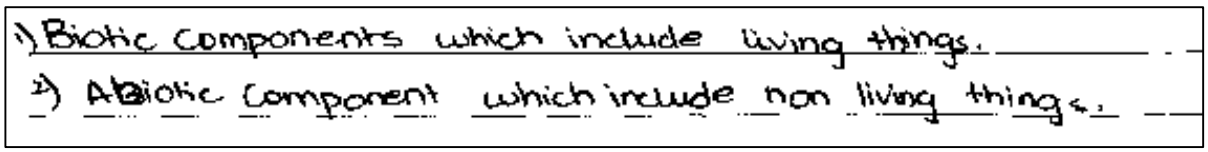


Weaker responses were unable to understand the meaning of edaphic factor. Most of the candidates struggled in responding the concept. Furthermore, some candidates have misinterpreted the edaphic factors as abiotic or climatic factors.

Example 1:

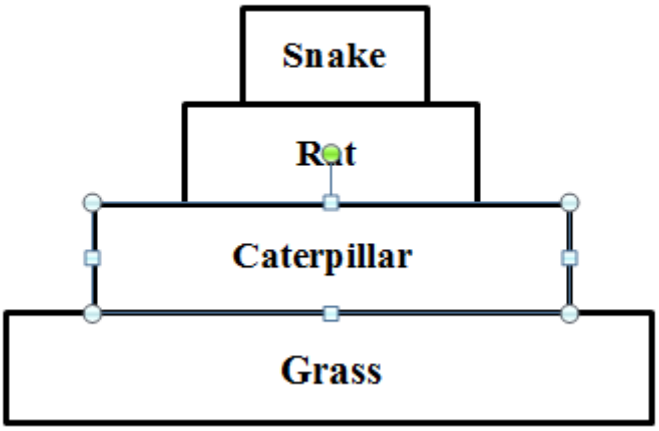


Example 2:



Question 7b:

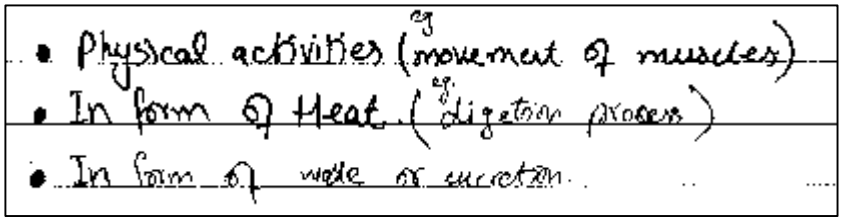
The given diagram illustrates a pyramid of energy.



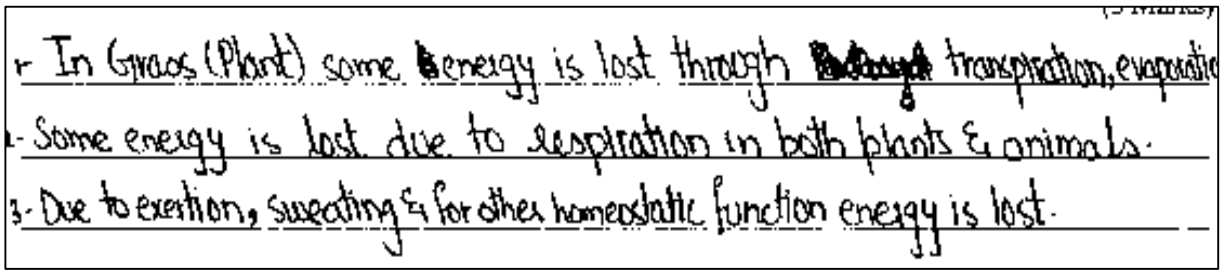
Mention any THREE biological means through which energy is lost from the given pyramid.

Better responses displayed clear understanding of the stimulus and lead in question. Furthermore, these responses were efficient to differentiate between the change in form of energy and biological means of energy loss at each trophic level.

Example 1:

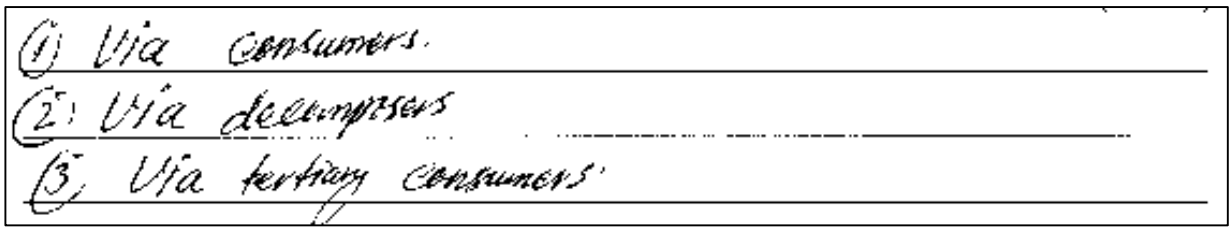


Example 2:

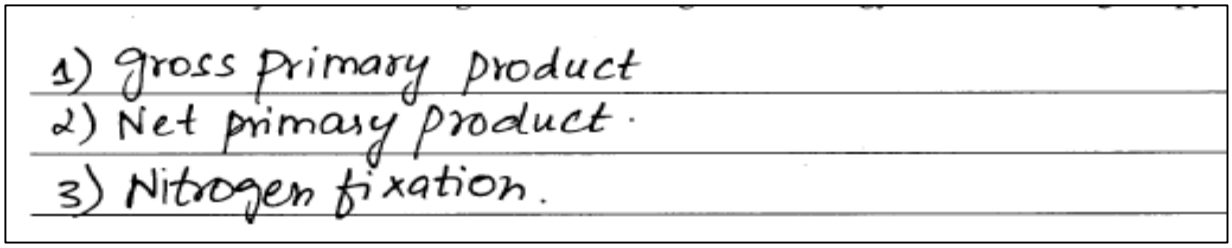


Weaker responses revealed candidates' carelessness in reading the stimulus and question, which led to misinterpretation of the given stimulus. These candidates struggled to recognise the difference between the change in form of energy and biological means of energy loss at each trophic level. Moreover, some other responses were irrelevant highlighted the links in trophic levels. Other irrelevant responses included some ecological terms related to food chains i.e. producers, consumers, decomposers or gross productivity, net primary productivity etc.

Example 1:



Example 2:

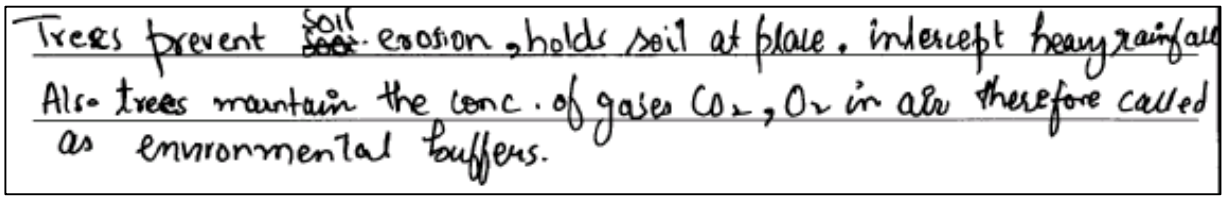


Question 7C:

Why trees are called environmental buffers?

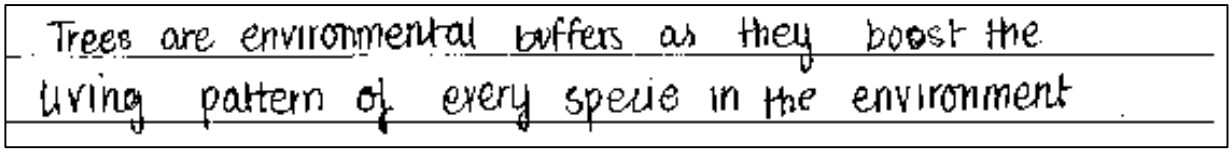
Better responses displayed clear understanding of the word buffer given in question. Such responses correctly mentioned the role of trees in regulation and maintenance of environment. These responses mentioned different examples such as regulating gases concentration, prevention of soil erosion, role in rainfall etc.

Example:

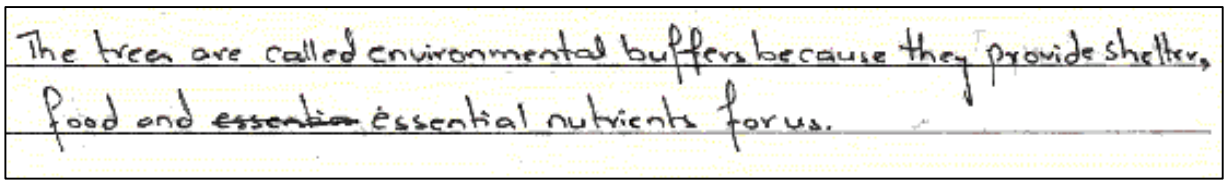


Weaker responses ambiguously described the regulatory role of trees reflecting that the candidates have not clearly understood the meaning of buffer that is the key word in question. Such responses mentioned generalised answers, for instance, trees provide food, shelter, etc.

Example 1:



Example 2:

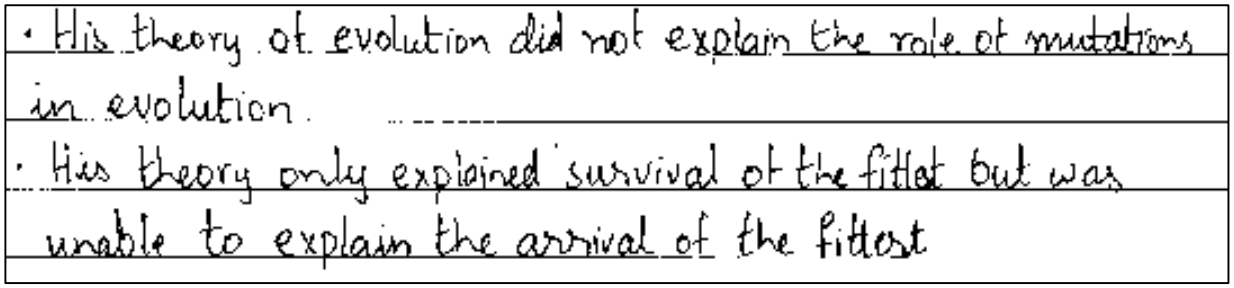


Question 8a:

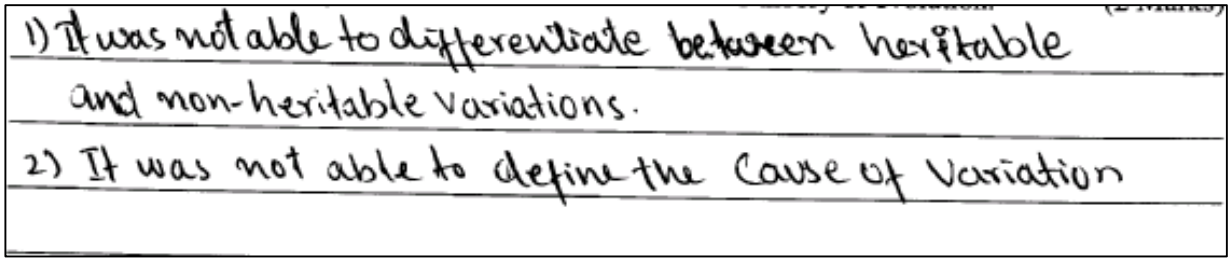
Mention any TWO objections that were made on Darwin's theory of evolution.

Better response correctly mentioned the objections made on Darwin's theory of evolution. These responses mentioned the objections such as Darwin theory could not provide evidence of arrival of species/ could not differentiate between heritable and non-heritable traits, it accounts for the preservation rather than the origin of variations, it did not explain the presence of vestigial organs. Furthermore, these responses mention that Darwin did not emphasized the role of mutation in evolution and had no explanation for neutral variations.

Example 1:

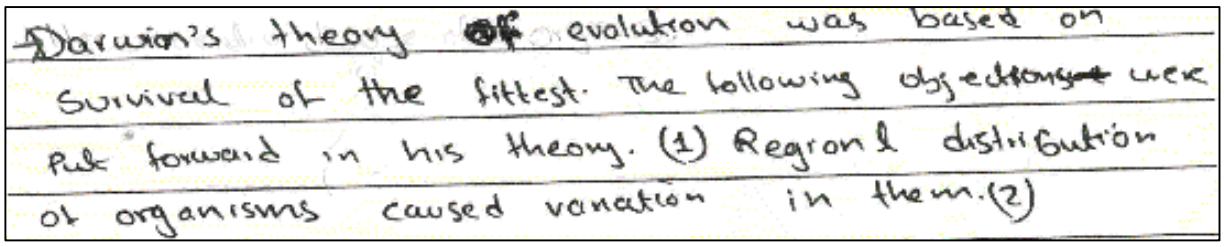


Example 2:

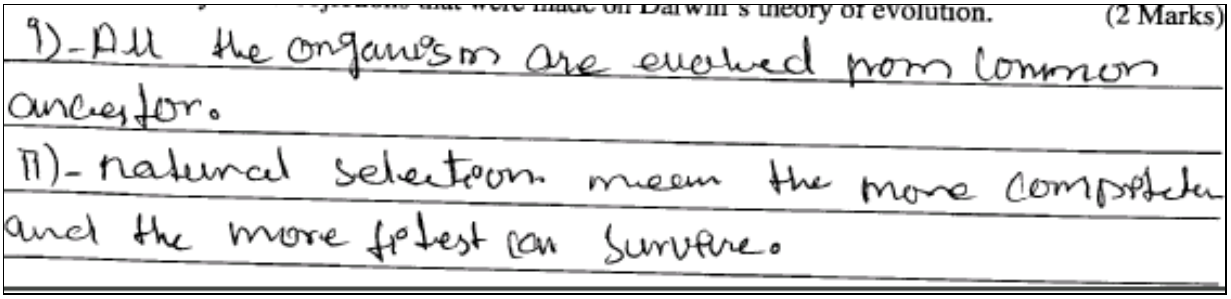


Weaker responses misinterpreted the question and described the postulates of Darwin's or Lamarck's theories of evolution. Some also describe the objections made on Lamarck's theory of evolution. Such responses revealed candidates' lack of understanding of the theories of evolution and the objections made on them and furthermore, the effect of rote memorisation.

Example:


Darwin's theory of evolution was based on survival of the fittest. The following objections were put forward in his theory. (1) Regional distribution of organisms caused variation in them. (2)

Example


were made on Darwin's theory of evolution. (2 Marks)

I)- All the organisms are evolved from common ancestor.

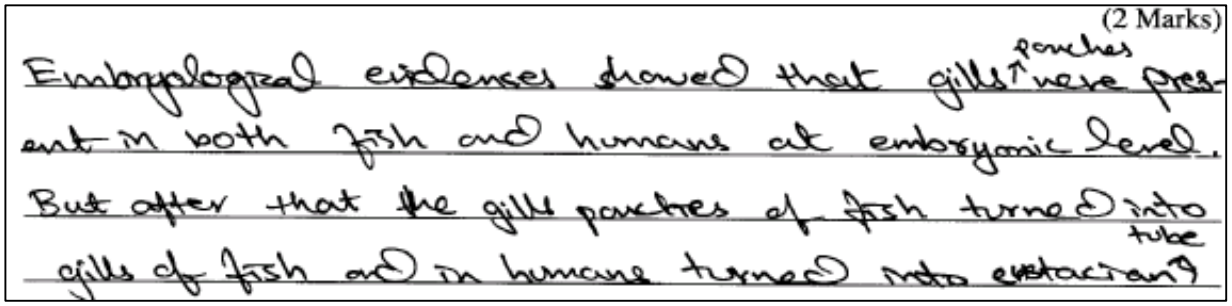
II)- natural selection mean the more competeter and the more fittest can survive.

Question 8b:

Describe the evolutionary relationship of gills in fish and eustachian tube in human beings.

Better responses exhibited familiarity with the different evidences of evolution which lead them to relate comparative embryology with the evolution of gills and eustachian tube in human being. Furthermore, these responses manifested appropriate use of scientific terminologies such as comparative embryology etc.

Example 1:


(2 Marks)

Embryological evidences showed that gills (pouches) were present in both fish and humans at embryonic level. But after that the gill pouches of fish turned into gills of fish and in humans turned into eustachian (tube)

Weaker responses displayed candidates' carelessness in reading the question properly. Most of these responses were generalized. Moreover, candidates failed to relate gills and eustachian tube as embryological evidence of evolutionary mechanism and their fate in fishes and human.

Example 1:

(2 Mark

Gills in fish & eustachian tube in humans show analogous similarity, means different structure but same function. Hence showing convergence.

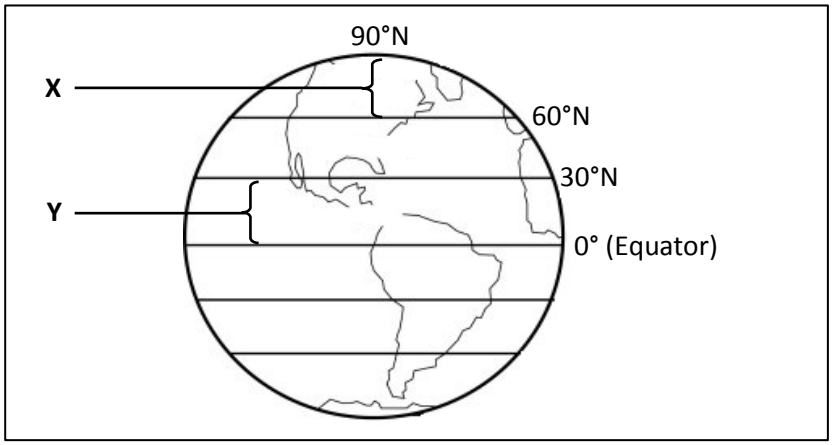
Example 2:

(2 Marks

Gills in fish and Eustachian tube have evolutionary relationship because they both are involved in Homeostatic function.

Question 9:

The given diagram represents distribution of biomes in the North latitude.



Complete the table using the given diagram.

Type of Terrestrial Ecosystem		
	X	**Y (Forest Ecosystem)**
Name of the Ecosystem		
Climatic Condition		

Better responses smartly used the diagram given in the stimulus and correctly identified the ecosystem and the prevailing climatic conditions such as temperature and rainfall. Furthermore, these responses exhibited better understanding of the major ecosystems on the biosphere.

Example 1:

	Type of Terrestrial Ecosystem	
	X	Y (Forest Ecosystem)
Name of the Ecosystem	Tundra	Tropical forests
Climatic Condition	cold climate	warm climate.

Example 2:

	Type of Terrestrial Ecosystem	
	X	Y (Forest Ecosystem)
Name of the Ecosystem	Tundra Ecosystem	Tropical rain Forests
Climatic Condition	Severe cold / freezing temperature	Heavy rainfall & warm climate

Weaker responses demonstrated lack of understanding of the given concept. Such responses unveiled that candidates used rote memorization method. Furthermore, such responses revealed misinterpretation of the diagram given in stem or stimulus. Moreover, some candidates mentioned the X ecosystem and its climatic condition in the column Y and vice versa.

Candidates are advised to be vigilant during drafting their responses.

Example 1:

	Type of Terrestrial Ecosystem	
	X	Y (Forest Ecosystem)
Name of the Ecosystem	Temperate deciduous ecosystem.	~~conif~~ coniferous forest ecosystem.
Climatic Condition	~~20c~~ very high temp 3°C – 40°C	Summer comes for a very short time period.

Example 2:

	Type of Terrestrial Ecosystem	
	X	Y (Forest Ecosystem)
Name of the Ecosystem	Deserts. ~~Tropical Deserts.~~	coniferous forests.
Climatic Condition	Dry with low annual rainfall.	prolonged and extremely cold winters.

Extended Response Questions (ERQs)

The following questions (10 and 11) offered a choice between part **a** and **b**.

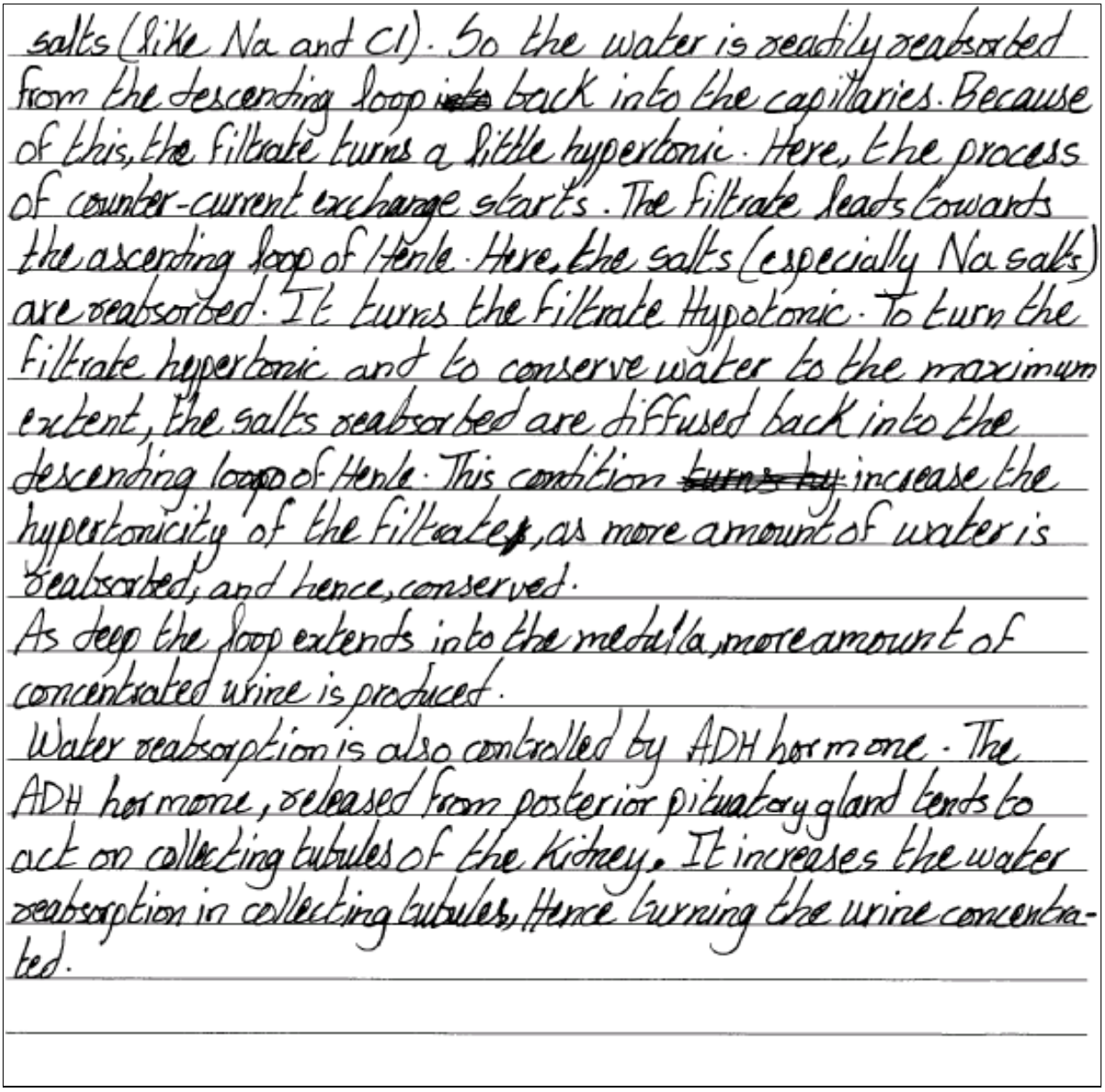
Approximately, larger number of candidates attempted part 'a' of question 10. This shows their interest in human biology. Similarly, in question 11, more preference of candidates was observed in part 'a' than part 'b'. This indicates that candidates are more confident in inheritance and genetics than ecosystems.

Question 10a:

With reference to the structure and function of the Loop of Henle, explain the production of concentrated urine by the human kidneys.

Better responses revealed strong grip in understanding the role of Loop of Henle in production of concentrated urine. Such responses unpacked the key part of stem, i.e. with reference to the structure and function of the **Loop of Henle**. Furthermore, these responses were able to focus on describing the reabsorption by Loop of Henle only as per demand of the question. Moreover, such responses correctly mentioned the changes in permeability of descending and ascending limb of loop of Henle. They also mentioned the osmolarity of the filtrate as it moves through the descending and ascending limb. Furthermore, they also mentioned the role of counter-current flow of filtrate and blood in production of concentrated urine. They also efficiently described the difference in water potential of cortical and medullary regions. Marks have been also credited to those candidates who correctly relate the length of loop of Henle in producing concentrated urine.

Example 1:



salts (like Na and Cl). So the water is readily reabsorbed from the descending loop ~~into~~ back into the capillaries. Because of this, the filtrate turns a little hypertonic. Here, the process of counter-current exchange starts. The filtrate leads towards the ascending loop of Henle. Here, the salts (especially Na salts) are reabsorbed. It turns the filtrate Hypotonic. To turn the filtrate hypertonic and to conserve water to the maximum extent, the salts reabsorbed are diffused back into the descending ~~loop~~ of Henle. This condition ~~turns to~~ increase the hypertonicity of the filtrate, as more amount of water is reabsorbed, and hence, conserved.

As deep the loop extends into the medulla, more amount of concentrated urine is produced.

Water reabsorption is also controlled by ADH hormone. The ADH hormone, released from posterior pituitary gland tends to act on collecting tubules of the kidney. It increases the water reabsorption in collecting tubules, Hence turning the urine concentrated.

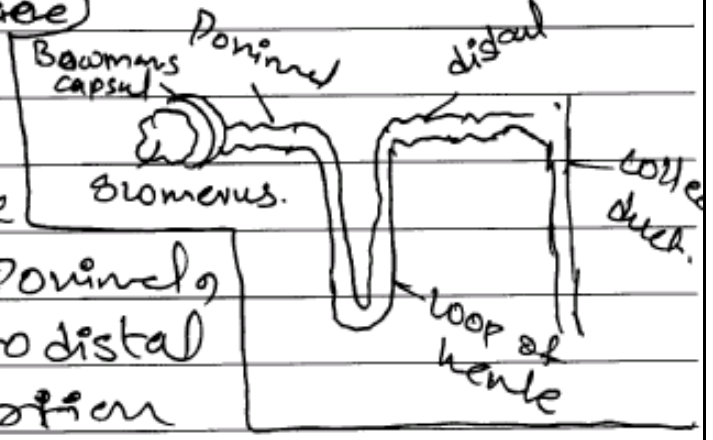
Weaker responses were unable to understand the key part of the stem. Such responses demonstrated poor understanding of the concept reabsorption by loop of Henle.

Most frequently appearing responses mentioned all rote memorised steps in the production of urine such as glomerular filtration, selective reabsorption and secretion.

Most of weaker responses mentioned hormonal control in urine formation that was not asked in question. These responses have neither mentioned the permeability nor the water potential of the fluid passing through loop of Henle. Furthermore, they have not mentioned the role of counter-current flow in efficiency of the mechanism.

Example:

→ Filtevation :- From Glomerus structure it filter the water, creatinee and glucose salt. after the glomerus filtevate it passed from Ponineg from Ponineal to distal Here is reabsorbtion take Place than they reabsorbe ~~co~~ H_2O, glucose and salt. the the function of loop of henle is to



reabsorbe the H_2O and then ~~the~~ the tubalar secreation process strab from collecting ~~the~~ duct, ~~collecting~~ ~~duct~~ in collecting duct secretion on salt, urea and creatine the collecting duct secreabe the waste product from kidney to urine bladder these waste pass out ~~from~~ in the form of urine through body.

Question 10b:

i. What is the advantage of learned behaviour for animals?

ii. Identify the type of learned behaviour for each description mentioned in the given table.

S. No.	Description	Type of Learned Behaviour
I	Pairing of an irrelevant stimulus with a natural primary stimulus	
II	Association of a stimulus with a reward	

iii. Elaborate each description (from part ii) with the help of an example or an experiment.

Better responses revealed familiarity and understanding of learned behavior and their types. Such responses in part I correctly described the advantage of learned behaviour to animals. These responses in the second part also mentioned the correct type of learned behavior such as conditioned reflex type 1 and conditioned reflex type 2 or operant conditioning related to the description given in the table.

In the third part of the question many candidates displayed ability to organise their answers in a coherent way and gave a well-structured account of the experiment or example related to the part ii of the question such as Pavlov experiments on dogs or any other relevant examples.

Example:

ii. Identify the type of learned behaviour for each description mentioned in the given table. (2 Marks)

S. No.	Description	Type of Learned Behaviour
I	Pairing of an irrelevant stimulus with a natural primary stimulus	Conditioned reflex type I
II	Association of a stimulus with a reward	condition reflex type II

iii. Elaborate each description (from part ii) with the help of an example or an experiment. (4 Marks)

(i) They can learn to adapt to different situation and it helps them to survive among the war for survival of the fittest.

(iii) Conditioned Reflex type I helps to understand the process of linking of an irrelevant stimuli with a natural stimulus. For exampel dogs salivate on food. If every meal time a bell is rung with the presentation of food dog salivates. If the bell would be rung first before this association dogs

would not salivate. But now after this experiment of associating Bell and food and performing it several times a change occurs. The dog starts salivating even on only the sound of the bell. Hence it was deduced the joining an artificial and natural stimulus was possible.

Conditioned Reflex typ II

In this association of stimulus take place but with a reward. The mouse is allowed to run in a maze till it finds exit or food. The mouse moves here and there and ultimately finds food or exit. If the mouse is run again in the maze it follows the path learned before to reach it's food directly. It learned the way unknowingly in the first experiment hence a stimulus was associated with a reward.

Weaker responses revealed unfamiliarity of candidates to the concept of learned behaviours. They have incorrectly described the advantages of learned behavior in part i. Similarly they have failed to respond correctly in the second leading part of the question in relating the description to the correct type of learned behavior. Ultimately these responses gave incorrect examples and irrelevant experiment and examples regarding learned behaviours.

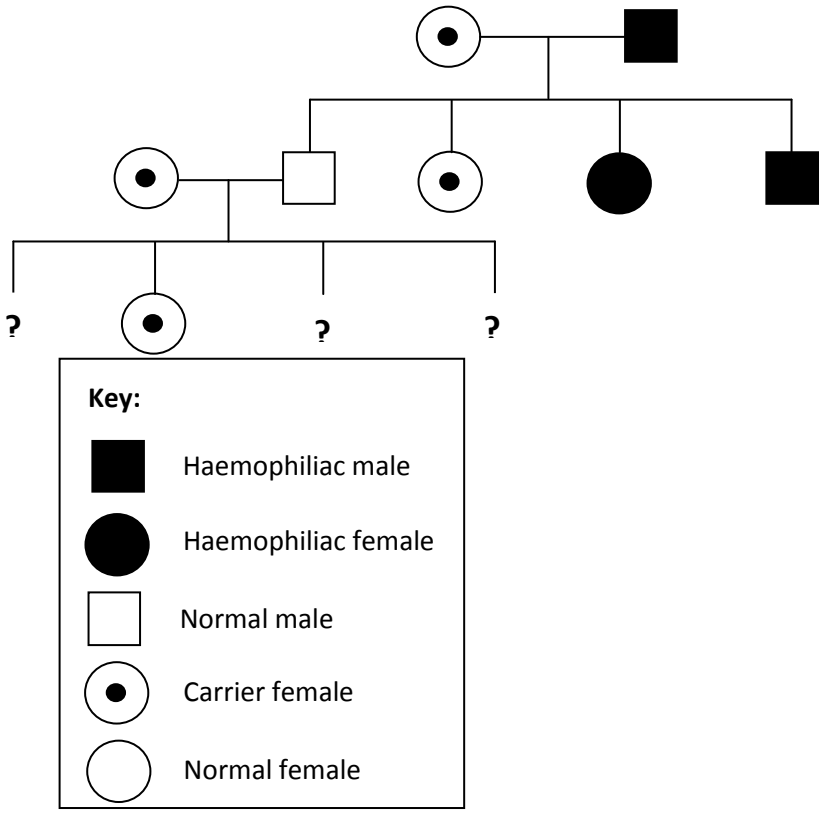
Example:

S. No.	Description	Type of Learned Behaviour
I	Pairing of an irrelevant stimulus with a natural primary stimulus	Not so natural behaviour.
II	Association of a stimulus with a reward	Natural behaviour.

ADVANTAGE OF LEARNED BEHAVIOUR:- The mast important benefit is they dont need to learn basic behaviour they obby towards environment. they dont need to do strugles to ~~[illegible]~~ live in over populated areas or ecasystem. They dont need to teach that how to fullFill their basic needs of food or living place.
Natural behaviour are those which are done by all of organism in their perticular species. which are so common in all of them. They dont try to act differently from the others

Question 11a:

The given pedigree shows the inheritance of haemophilia.



i. Identify the phenotypes of the unknown offspring in the given pedigree.

ii. Describe the pattern of inheritance of haemophilia in male and female individuals referring to the given pedigree.

Better responses correctly identified the phenotypes of the unknown offspring in the pedigree in part i. Moreover, such responses clearly described the pattern of inheritance and mentioned haemophilia as an **X-linked recessive disease.** These responses included the reason with description that haemophilia usually affects males. Most of the responses explain the inheritance of a carrier female. Furthermore, they also include that how a carrier female and a hemophilic male pass on this disease to their off springs. Such responses demonstrate their working by punnet squares or probability ratios.

Example:

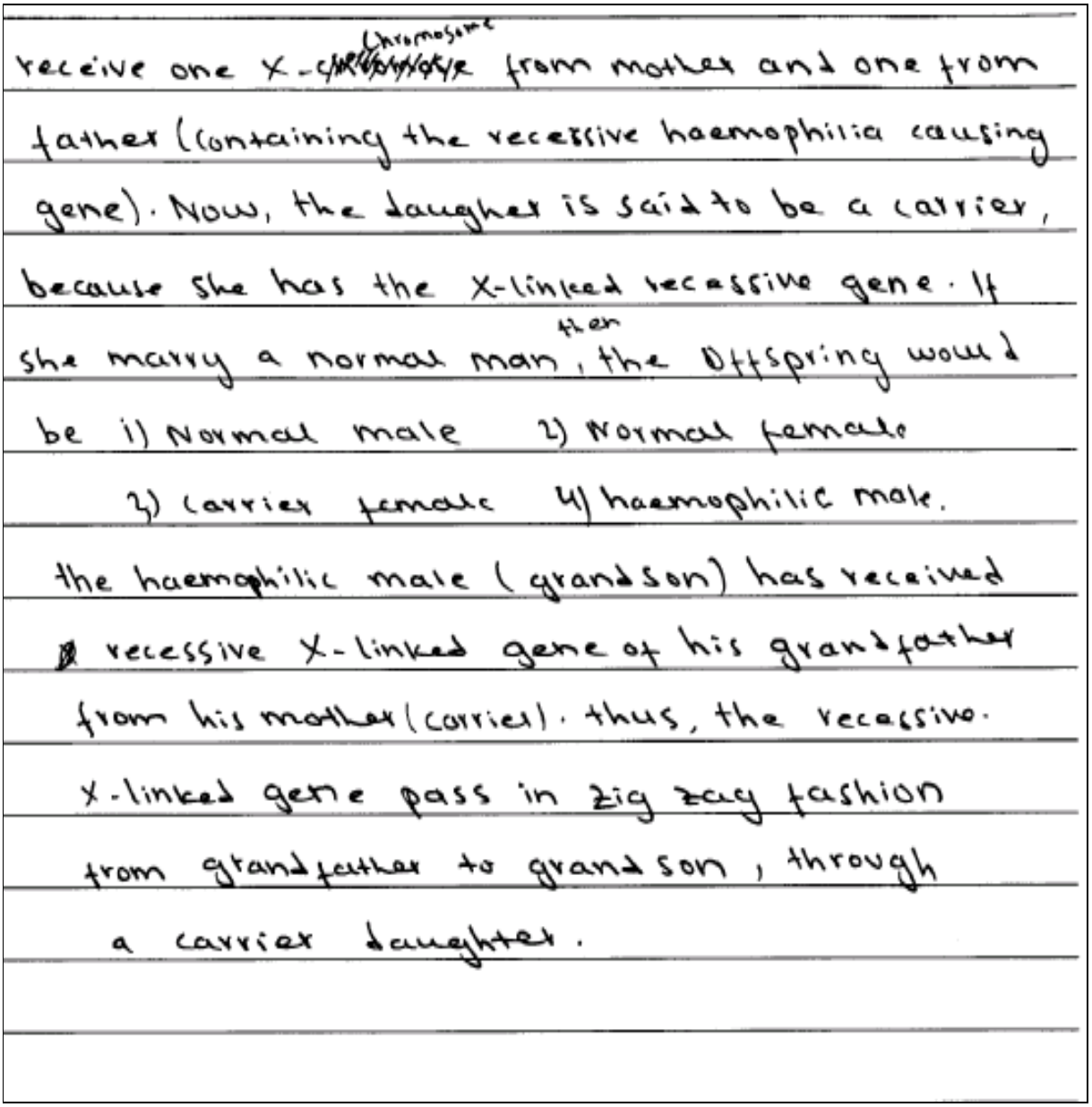
i - When the Normale male marry a carrier women as mentioned in the given pedigree, then along with carrier female, the following phenotype will present in offspring.

e.g $X^hY \rightarrow$ haemophiliac male.

$X^HX^H \rightarrow$ Normal female.

$X^HY \rightarrow$ Namal male.

(ii) Haemophilia is a recessive - X-linked disease. It affect male more, than women because it is absent from Y-chromosome, so, a single recessive gene in male, can express itself. A grandfather don't transfer this gene directly to his grand son, so, it transfer / pass the gene to his grand son, through carrier daughter. the haemophilic grandfather can't pass the gene to his son, because he receive only Y-chromosome from him, while the daughter.


receive one X-chromosome from mother and one from father (containing the recessive haemophilia causing gene). Now, the daughter is said to be a carrier, because she has the X-linked recessive gene. If she marry a normal man, then the offspring would be 1) Normal male 2) Normal female 3) carrier female 4) haemophilic male. the haemophilic male (grandson) has received recessive X-linked gene of his grandfather from his mother (carrier). thus, the recessive X-linked gene pass in zig zag fashion from grandfather to grandson, through a carrier daughter.

Weaker responses showed candidates' confusion in learning of the concepts of inheritance. Most of the responses provided irrelevant description such as showing test crosses with incorrect genotypes. Such responses revealed that the candidates are less confident in their knowledge of genes, alleles and pattern of inheritance.

Example:

The phenotype of unknowns are :

carrier female : normal male : haemophilliac mal

1 2 1.

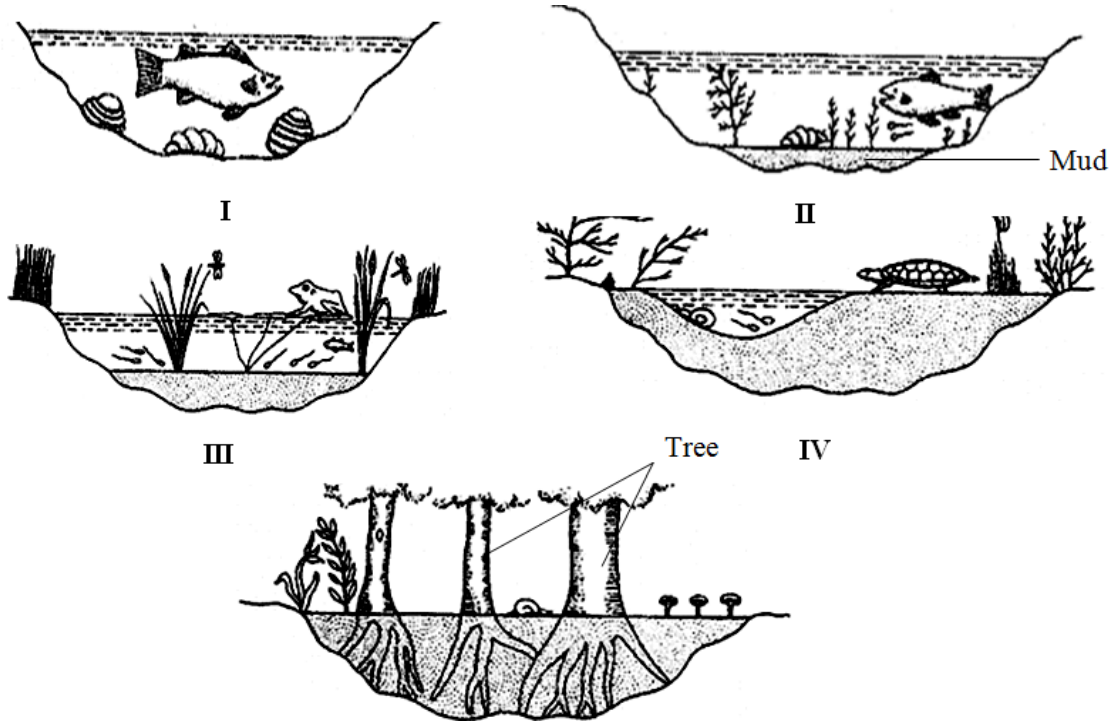
→ The ratio is formed as 1:2:1.

2) The carrier female did cross with a male having haemophilia, they then have children out of which 2 of them are haemophilliac female and male, one is the carrier female and only one of them, is normal male.

Now this normal male did a cross with a female who was a carrier, now when they have children the haemophilia is appeared in only one individual ie a male haemophilic, a carrier female and two normal male. This is because in this case a female has haemoph carrier not a male, that is why dominant out of all is normal male. and only one of them got haemophilia.

Question 11b:

The given diagrams show different stages, **I** to **V**, involved in the hydrarch succession.



i. Name the group of species which forms the pioneer community in hydrarch succession.
ii. Identify the diagram that represents the climax stage.
iii. Describe the features of the given stages, **II**, **III** and **IV**

Better responses displayed good understanding of the hydrarch succession by naming the species which forms the pioneer community in part i and furthermore by identifying the climax stage in part ii.

In the third part of the question, better responses clearly described the features of the given stages II as submerged plant stage, III as Reed swamp and IV as sedge meadow or woodland stage.

Example:

b. (i) The group of species which forms the pioneer community in a hydrosere are phytoplanktons and zooplanktons which includes Amoeba, paramacium, euglena etc. The phytoplanktons include bluegreen algae (cyanobacteria), green algae (spirogyra), diatoms and bacteria.

(ii) The diagram V represents the climax stage which consists of trees mainly.

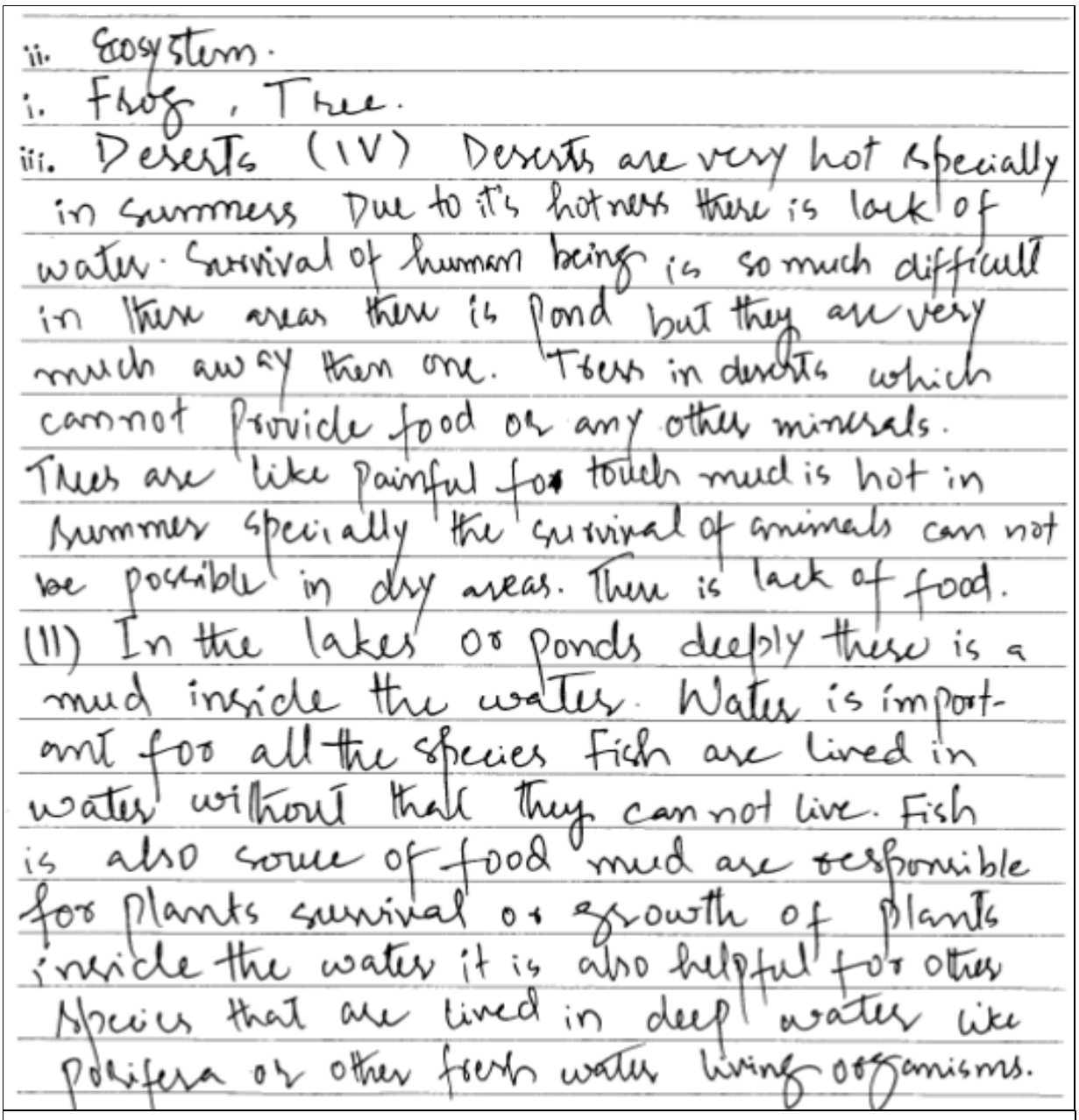
(iii) Stage II: In this stage due to death of phytoplanktons and zooplanktons, the soil becomes favourable for the growth of rooted hydrophytes and the soil also becomes softer. These hydrophytes then die and decompose and also releases nutrients in the soil which decreases the water depth.

Stage III: In this stage the water level is decreased to a few feet or more due to death of hydrophytes. Therefore another type of plants starts to produce. These plants are rooted in the soil but there leaves float on the surface of the water and these plants accelerate water losses due to transpiration thus decreasing the water depth.

Stage IV: In this stage water level is reduced to a greater extent due to transpiration and plants are

Weaker responses exhibited amalgamation of different concepts in succession. Such responses described the features of Xerarch or Xerocere succession. Teachers are highly recommended to teach these concepts describing the comparative account of both types of succession using diagrams; this will enable students to differentiate among different concepts in ecological succession.

Example:



ii. Ecosystem.
i. Frog, Tree.
iii. Deserts (IV) Deserts are very hot specially in summers Due to it's hotness there is lack of water. Survival of human being is so much difficult in these areas there is pond but they are very much away them one. Trees in deserts which cannot provide food or any other minerals. Trees are like painful for touch mud is hot in summer specially the survival of animals can not be possible in dry areas. There is lack of food.
(II) In the lakes or ponds deeply there is a mud inside the water. Water is important for all the species Fish are lived in water without that they can not live. Fish is also source of food mud are responsible for plants survival or growth of plants inside the water it is also helpful for other species that are lived in deep water like porifera or other fresh water living organisms.

formed above the water table. These plants have well developed rhizome system. The plants ~~or~~ growth deepens and a marshy vegetation is formed containing marshy soil.

(III) the weather climate is good where frog end the hibernation of 6th months this diagram shows the summer wether where frog like to live in pools or pond where they make reproduction. it is a fresh water where trees are showed in such way that makes beauty of nature. In this season the weather is so good. frog is ready live for six months in this condition.