Aga Khan University Examination Board

Notes from E-Marking Centre on HSSC-II Biology Examination May 2017

Introduction

This document has been produced for the teachers and candidates of Higher Secondary School Certificate (HSSC-II) Biology. It contains comments on candidates' responses to the 2017 HSSC-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 SLOs 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 unable to understand the demand of the question; often because they had not read the question carefully. At times, candidates responded by restating the stem of the question. Furthermore, understanding the use of scientific terminology and interpretation of unseen diagrams and graphs was also weak. However, candidates outdid in the concepts of semi-conservative DNA replication, interphase of cell cycle and succession. Nevertheless, there is still room for improvement; mentioned below are few specific concepts that teachers need to focus in classrooms so that the candidates may perform better.

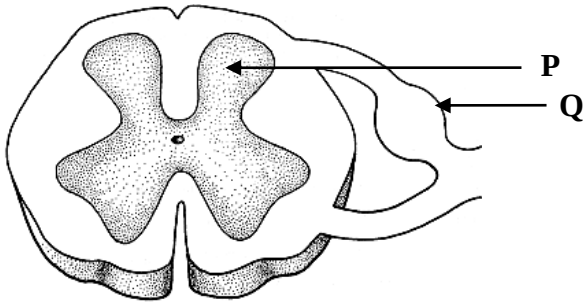
a. Concept of meiosis in spermatogenesis and oogenesis, genome library, wild life corridors, evidences of evolution
b. Illustration of Sarcomere in the mechanism of muscle contraction
c. Classification of animals on the basis of source of heat production
d. Pattern of X-linked recessive inheritance

Detailed Comments:

Constructed Response Questions (CRQs)

Question 1:

The diagram shows a cross section of the spinal cord of human being.



Describe the structures that are labelled as **P** and **Q**.

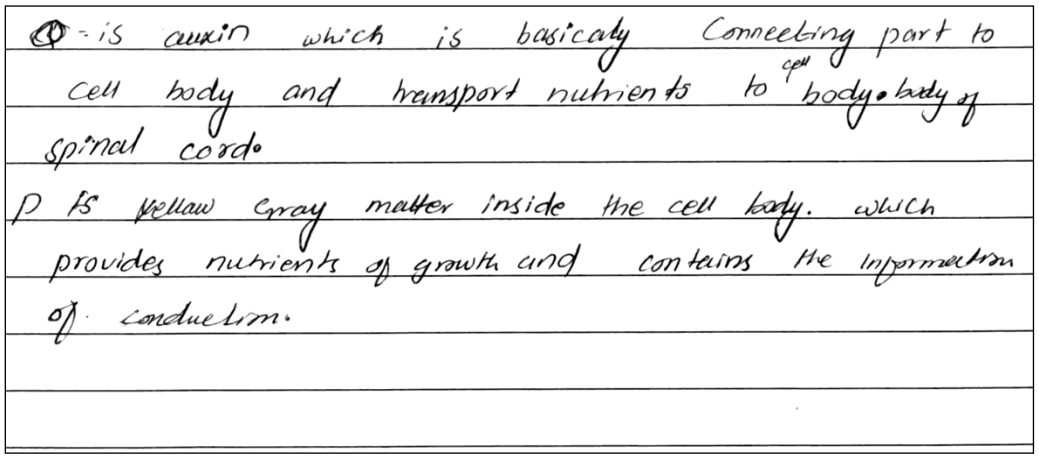
Better responses correctly described the structures **P** and **Q** in the diagram, such as grey matter of spinal cord/ butterfly shape/ containing cell bodies of motor neurons, associated/ relay neurons and non-myelinated nerve fibres or tracts/ mixed neurons/ possesses a central canal/ forms three pairs of horns throughout most of the spinal cord and dorsal root ganglion/ contains the cell bodies of sensory neurons respectively.

Example:

The structure 'P' is a grey part of spinal cord. It is butterfly in appearance and contain a central canal which contain CSF. It is consist of non-myelinated neurons.
The structure 'Q' is dorsal ganglion, which contain cell bodies of sensory neurons, which carry nerve impulse towards spinal cord.

Weaker responses indicated that candidates were unable to correctly describe the structures. Most of the weaker responses gave ambiguous answers such as structure P is the collection of different neurons/ Q is white matter of spinal cord/ both P and Q help in transmission of information.

Example:



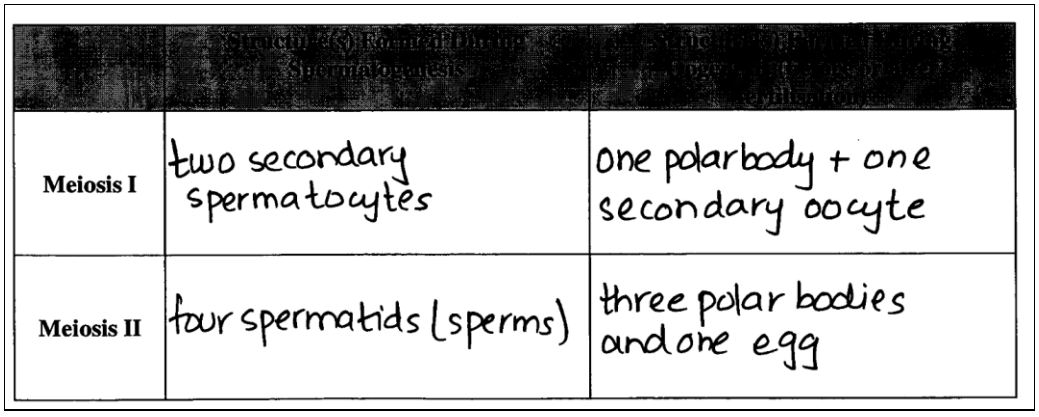
Question 2:

Complete the given table stating the name(s) of structure(s) formed during spermatogenesis and oogenesis in meiosis I and II.

	Structure(s) Formed During Spermatogenesis	**Structure(s) Formed During Oogenesis(before or after fertilisation)**
Meiosis I		
Meiosis II		

Better responses stated the names of structure(s) formed during meiosis I and II of spermatogenesis as secondary spermatocytes and spermatids/ sperms respectively. The names of structure(s) formed during meiosis I and II of oogenesis as secondary oocyte and a polar body and ovum/ polar bodies respectively. However, better marks have been awarded to those responses which mentioned the names of parts of sperms in the meiosis II of spermatogenesis, i.e. head and tail and some have drawn the structure of sperm whereas, in meiosis II of oogenesis a circle was drawn labelled as egg/ ovum.

Example:



Meiosis I	two secondary spermatocytes	one polarbody + one secondary oocyte
Meiosis II	four spermatids (sperms)	three polar bodies and one egg

Weaker responses stated incorrect names of structures of spermatogenesis formed during meiosis I and II, i.e. primary spermatocytes/ spermatozoa/ spermatogonia and incorrect names of structures in meiosis I and II of oogenesis, i.e. primary oocyte/ oogonia.

Candidates frequently confuse similar-sounding or similarly spelled terms in biology. Most of candidates were unable to distinguish between different biological terminologies, i.e. primary spermatocyte and secondary spermatocyte, spermatogonia and spermatid, primary oocyte and secondary oocyte.

It is recommended to use flowcharts and diagrams for teaching this topic and integrating gametogenesis with meiosis for better understanding of the topic. This will enable students to develop conceptual linkages between different SLOs.

Example:

	Structure(s) Formed During Spermatogenesis	Structure(s) Formed During Oogenesis (before or after fertilisation)
Meiosis I	Spermatocyte	oocyte,
Meiosis II	Sperms	eggs.

Question 3a:

Sara and Zara are twins but do not resemble each other. Describe the phenomenon responsible for this situation.

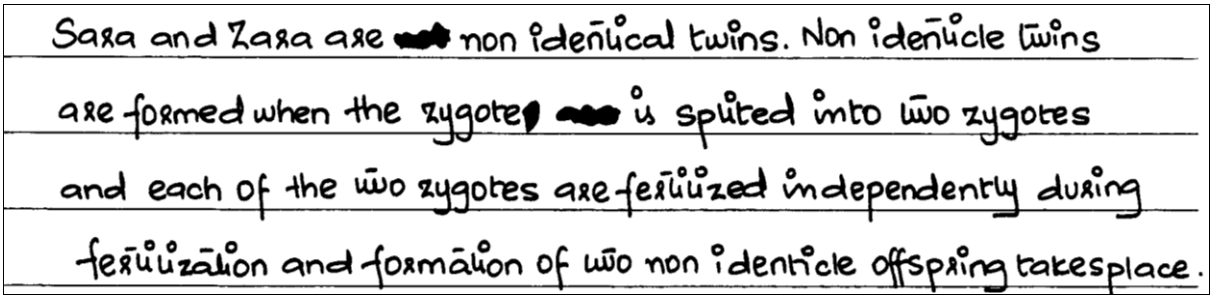
Better responses showed correct comprehension of question statement, i.e. Sara and Zara are non-identical twins and described the phenomenon as independent fertilisation of two different zygotes by two sperms; therefore, they are genetically and phenotypically different from each other.

Example:

Sara and zara and fateral twins. In some conditions ovaries produces more than one egg and these eggs are fertilized by individual sperms resulting two or more zygotes. These twins are produced sexually and may or may not have the same sex.

Weaker responses showed lack of care in reading the question statement and it resulted in misunderstanding of the question. Most of the weaker responses focused on the first part of question, i.e. 'Sara and Zara are twins' and overlooked the connecting part of the question, i.e. 'But do not resemble each other', therefore, some responses showed partially correct description but limited relevance to the question that had been asked.

Example:

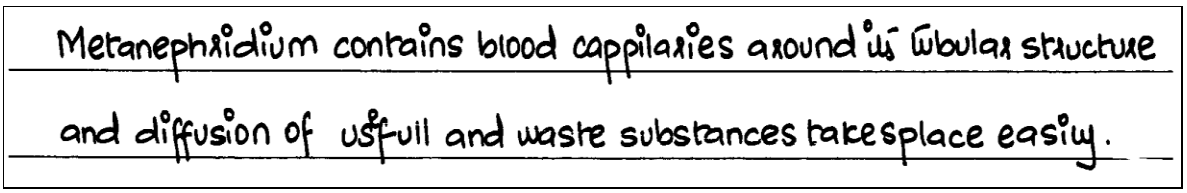


Question 3b:

Mention a property of metanephridia that makes it more developed than protonephridia.

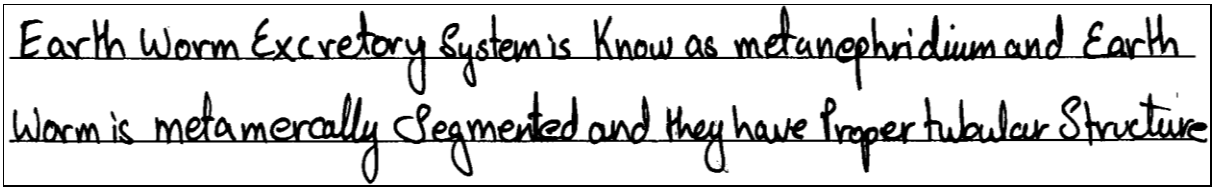
Better responses correctly mentioned the property of metanephridia, i.e. it is opened at both ends/ internal openings are present/ surrounded by a network of blood capillaries that assists excretory material formation and convoluted tubule. It is evident from the responses that candidates have better understanding of diagrams of excretory system (metanephridia) of earthworm and (protonephridia) of planaria.

Example:

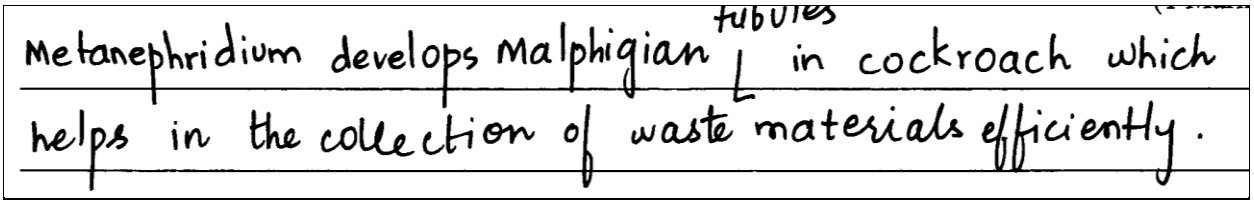


Weaker responses were unable to compare the excretory systems, i.e. metanephridia and protenephridia. It is advised that SLO number 15.5.2 should be discussed with the students using the diagrams of excretory systems of animals and students must be asked to compare the structures for better understanding of systems. Use of diagrams will improve the conceptual understanding of students.

Example 1:

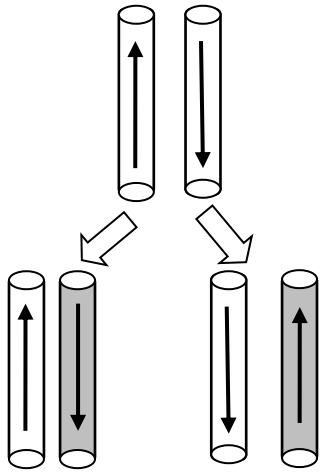

Earth Worm Excretory System is Know as metanephridium and Earth Worm is metamerally Segmented and they have Proper tubular Structure

Example 2:


Metanephridium develops Malphigian tubules in cockroach which helps in the collection of waste materials efficiently.

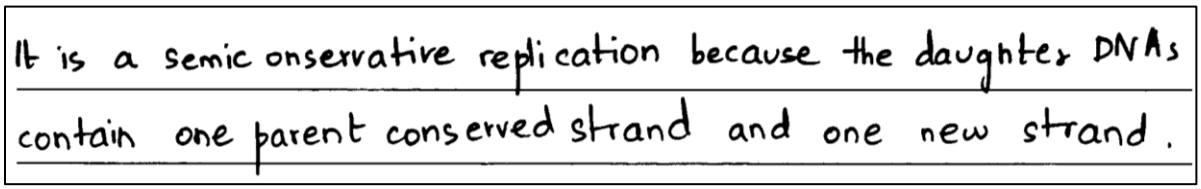
Question 3c:

Justify that the given diagram depicts semi-conservative replication of DNA.



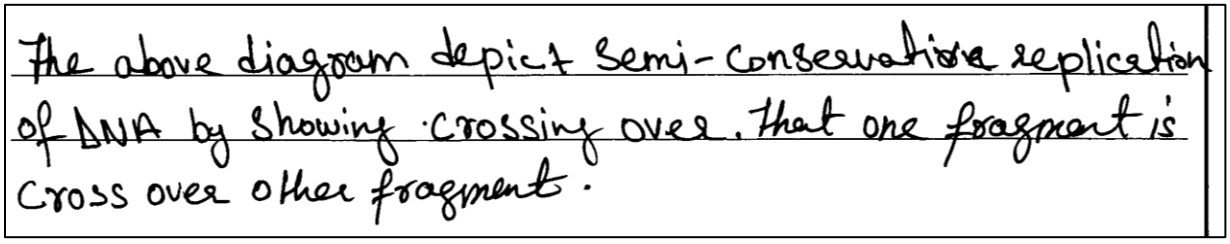
Better responses presented justification that the diagram depicts semi-conservative replication of DNA very clearly; such as, each daughter strand containing one old strand (parental) and new strand. Some other credit-worthy responses depicted that each strand of DNA serves as template to form new complimentary strand.

Example 1:



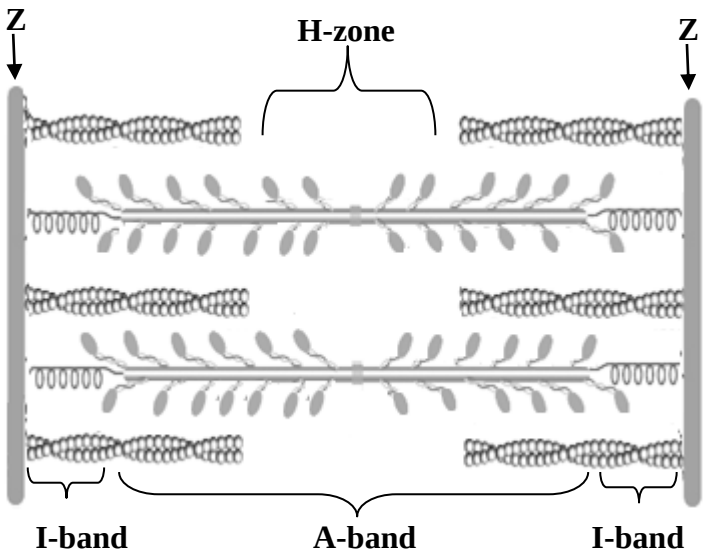
Weaker responses were unable to identify the given diagram as DNA strands and erroneously identified it as cylindrical tubes with dark and light shades. Some other weaker responses gave vague answers like crossing over/ duplication of fragments/ cloning of DNA strands, etc. In this question, typical diagram of DNA strands was not used which might have confused candidates. Therefore, it is advised to use multiple diagrams in classroom practice for better understanding of such concepts.

Example:



Question 4a:

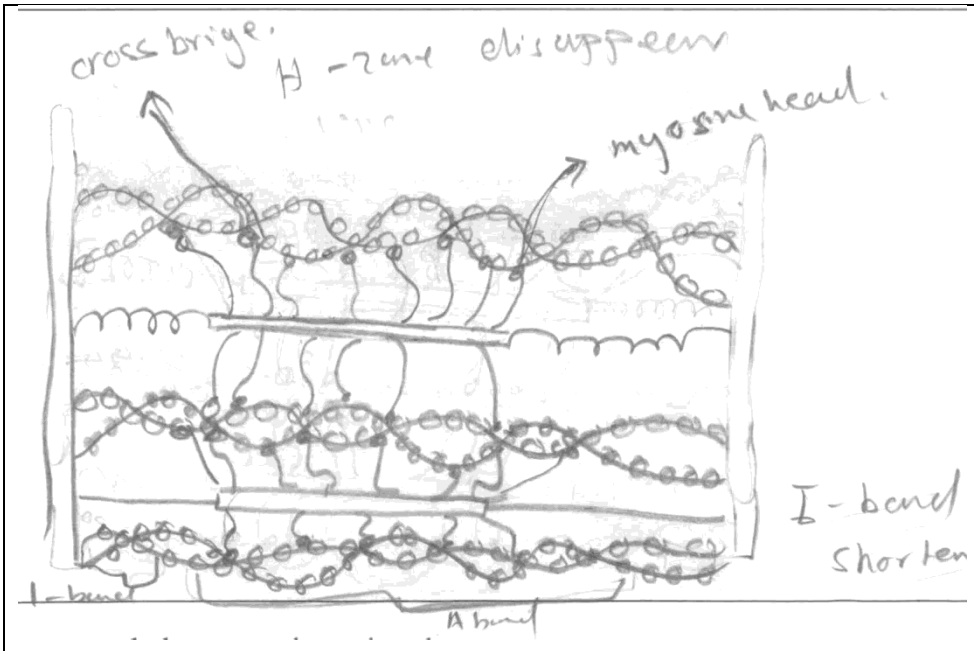
The given diagram represents sarcomere in the relaxed condition.



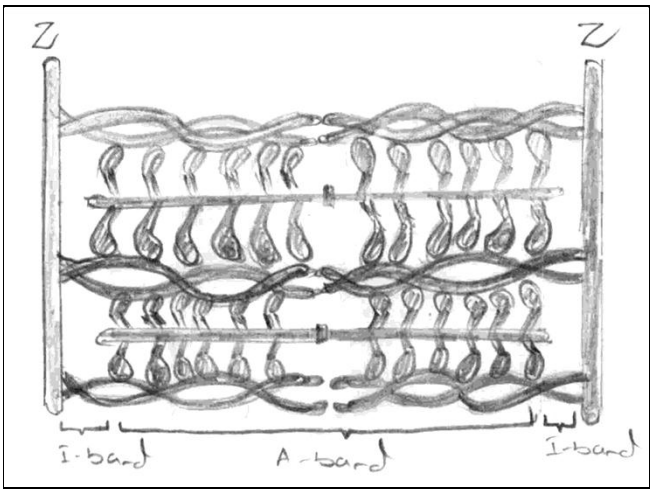
Sketch the sarcomere in the given space when it is in the contracted condition.

Better responses showed the cross bridge formation/ attachment of myosin head with actin filament, disappeared H-zone; shorten I-band and A band and closer Z lines.

Example 1:

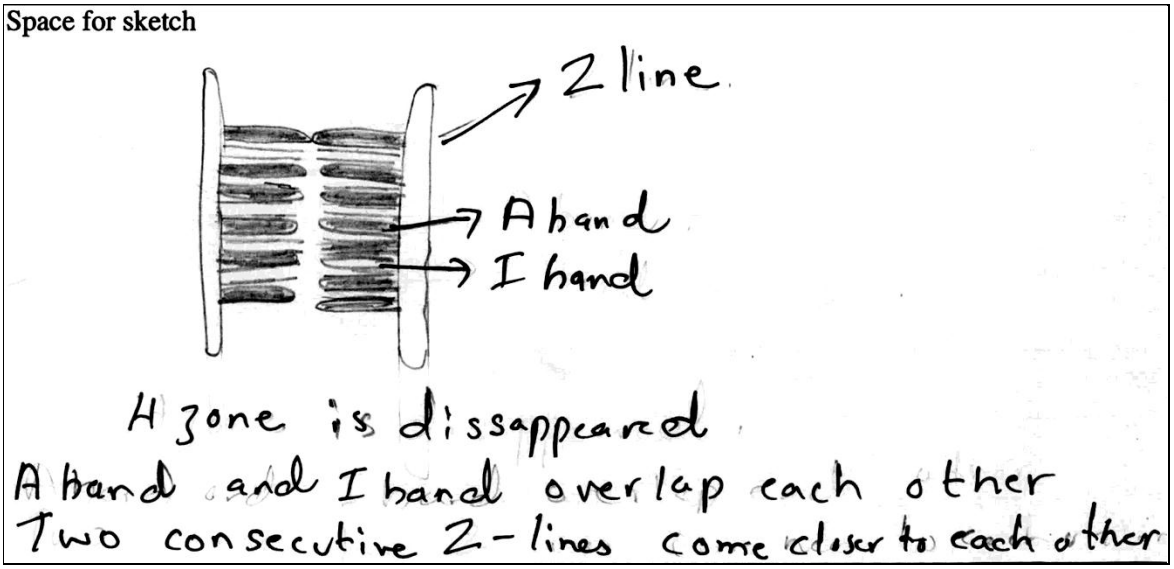


Example 2:



Weaker responses redrew the diagram exactly the way it is presented in the question. Most of the weaker responses were unable to show attachment of myosin head with actin filament/ cross bridge formation. Diagram was labelled as contraction of Z-lines. A common misconception was observed that in the mechanism of muscular contraction Z- lines contract, whereas, Z-lines come closer due to overlapping of thick (myosin) and thin (actin) filaments. It is highly recommended to use diagrams/ images/ videos to deliver SLO 16.5.5for better understanding of this concept.

Example 1:



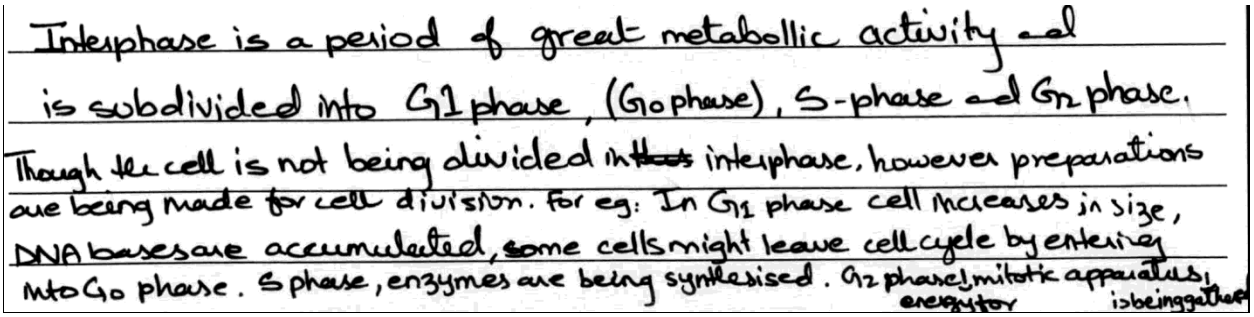
Question 4b:

Interphase is commonly known as the resting phase.

Justify that, the above concept is misleading.

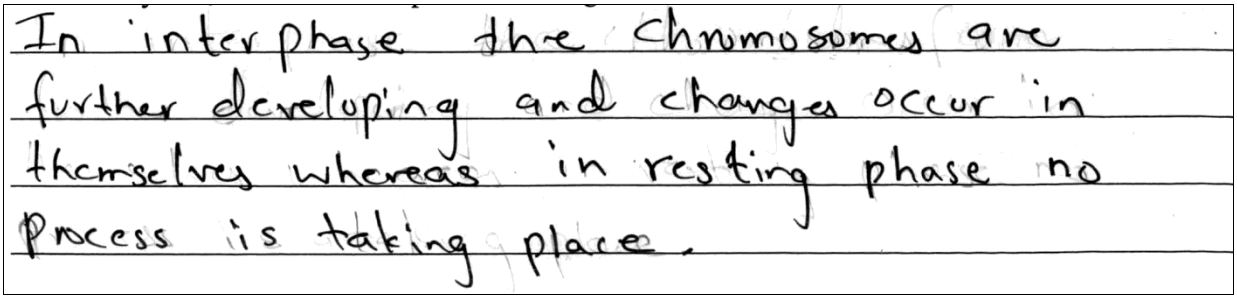
Better responses showed clarity in the concept of interphase that, apparently at this stage, cell is not divided and thereby justifying that interphase is the stage of extensive metabolic activities.

Example:


Interphase is a period of great metabollic activity and is subdivided into G1 phase, (Go phase), S-phase and G2 phase. Though the cell is not being divided in ~~the~~ interphase, however preparations are being made for cell division. For eg: In G1 phase cell increases in size, DNA bases are accumulated, some cells might leave cell cycle by entering into Go phase. S phase, enzymes are being synthesised. G2 phase, mitotic apparatus, ~~erogytor~~ is being gathered

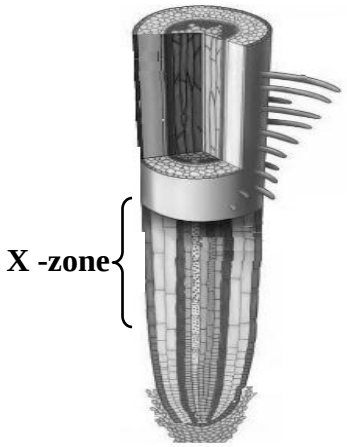
Weaker responses displayed misunderstanding of the question statement. Most candidates rewrote the statement i.e., interphase is commonly known as resting phase.

Example:


In interphase the chromosomes are further developing and changes occur in themselves whereas in resting phase no process is taking place.

Question 5a:

The given diagram depicts the structure of a generalised root tip of a plant.



i. Name the **X-zone** shown in the diagram.

ii. Mention any THREE changes that occur in the cells of zone **X**.

Better responses showed that candidates had a good understanding of the given diagram as they were able to correctly identify the X-zone as zone of elongation.

Better understanding of diagram assisted to give appropriate answer to the second part of the question; therefore, candidates were able to mention correct changes occurring at zone of X such as cell volume increases due to uptake of water, plasticity of the cell wall increases and cell wall pressure reduces.

Example:

i. Zone of elongation.

ii. (i) Volume of the cell increases upto 150 folds due to the uptake of H_2O

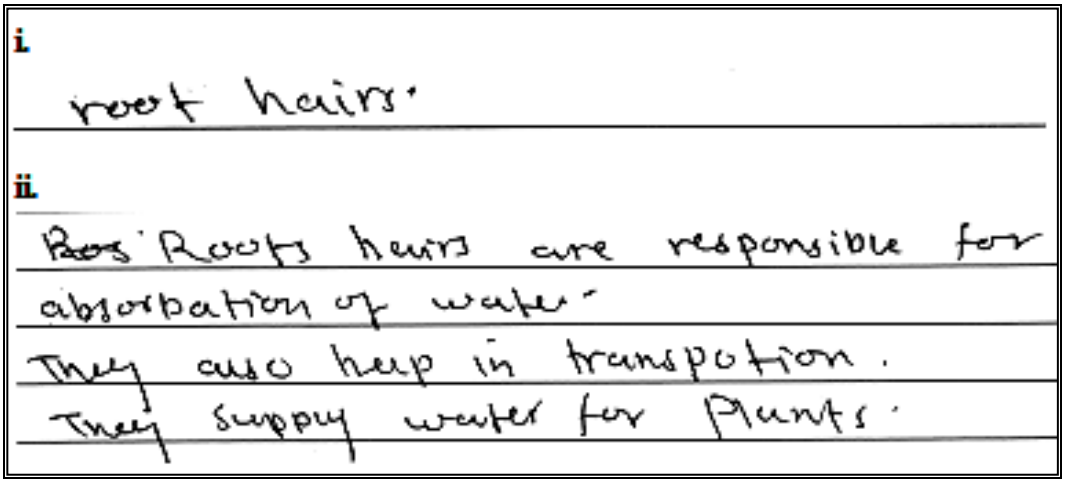
(ii) Cell size increases i.e cell elongates.

(iii) Wall pressure reduces.

(iv) Cells become ~~turgor~~ turgid, stiff & acquires a shape.

Weaker responses indicated that candidates struggled to correctly identify the X-zone; therefore, they were unable to mention the changes taking place at the given zone. Weaker responses gave ambiguous and generalised answers such as development of cellular parts/ formation of tissues/ cell maturation, etc.

Example:

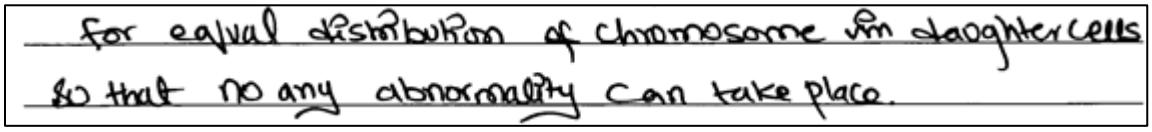


Question 5b:

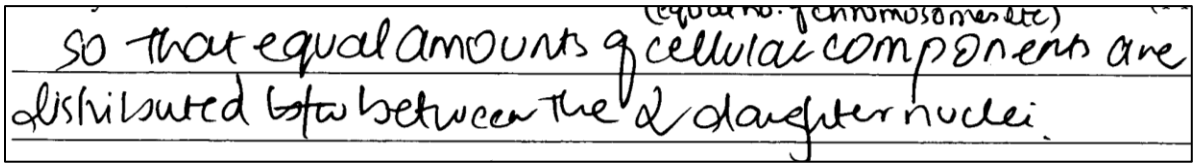
Why is the plane of cleavage furrow always perpendicular to the mitotic spindle during cytokinesis?

Better responses exhibited candidates' good understanding of cytokinesis, therefore, they were able to give correct reason, i.e. to ensure the segregation of two sides of chromosomes into separate daughter cells/ to ensure each daughter cell inherits one copy of each parent nucleus/ daughter cell inherits one copy of each parent nucleus/ equal distribution of cell content (chromosomes and cytoplasm).

Example 1:

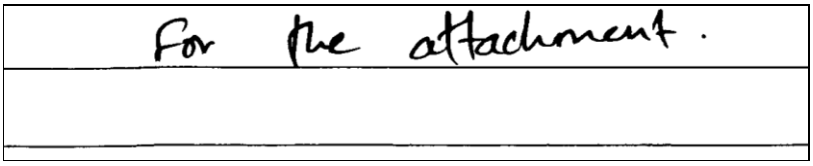


Example 2:



Weaker responses reflected that candidates misunderstood the question. Most of the weaker responses did not meet the demand of question because they focused on 'what' happens rather than focussing on 'why' a particular event occurs during cytokinesis. Answers were expected to be focused on the reason. Candidates are advised not only to learn what happens in a particular process but also to understand the purpose of that event. Hence, in classroom practice questions assessing 'why', 'to what extent', etc. should be focussed as well

Example 1:



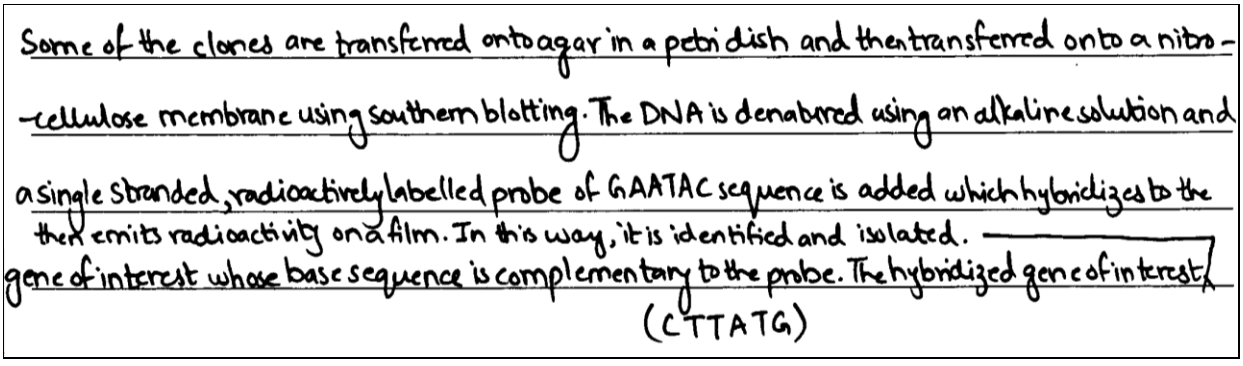
Question 6a:

Genome library is the collection of thousands of clones of DNA fragments. A genetic engineer is asked to find out the gene of interest from the genome library using **GAATAC** nucleotide sequence.

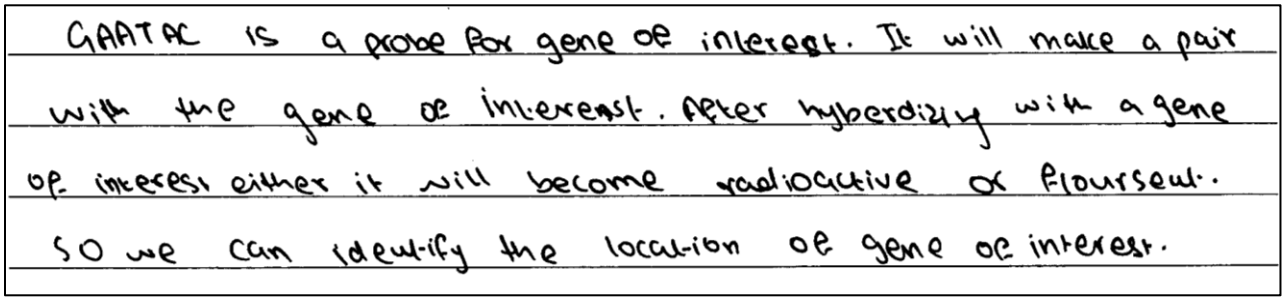
How can the **GAATAC** nucleotide sequence be useful to search out gene of interest and trace out its location from genome library?

Better responses exhibited wise use of information given in the stimulus, i.e. GAATAC nucleotide sequence. These responses accurately described the use GAATAC nucleotide sequence as a radioactive/ fluorescent probe which will hybridize/ pair up with its complimentary nucleotide sequence (gene of interest) and thus radioactive/ fluorescent probe will help to trace out the location.

Example 1:

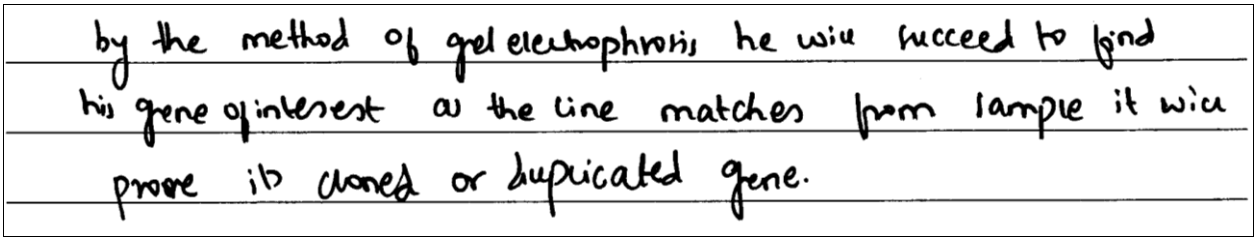


Example 2:


GAATAC is a probe for gene of interest. It will make a pair with the gene of interest. After hyberdizing with a gene of interest either it will become radioactive or flourseut. SO we can identify the location of gene of interest.

Weaker responses displayed candidates' inability to relate stimulus with question in order to get the correct answer. Such responses either ignored the stimulus or inaccurately used the information in the stimulus. Irrespective of stimulus, different techniques in genetic engineering were described; such as, gel electrophoresis, DNA finger printing or recombinant DNA technology.

Example:

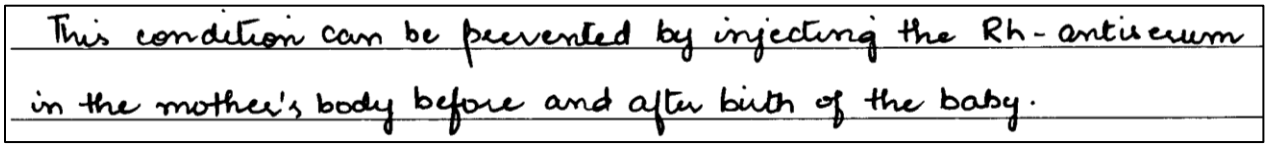

by the method of gel electrophoresis he will succeed to find his gene of interest as the line matches from sample it will prove it cloned or duplicated gene.

Question 6b:

When an Rh^{-ve} mother conceives an Rh^{+ve} baby, it may result in erythroblastosis foetalis. How can this condition be prevented?

Better responses exhibited sound understanding of maternal-foetal Rh incompatibility. These responses mentioned the correct method of prevention from erythroblastosis foetalis, i.e. by giving mother an injection of Rh antiserum during pregnancy and immediately after birth.

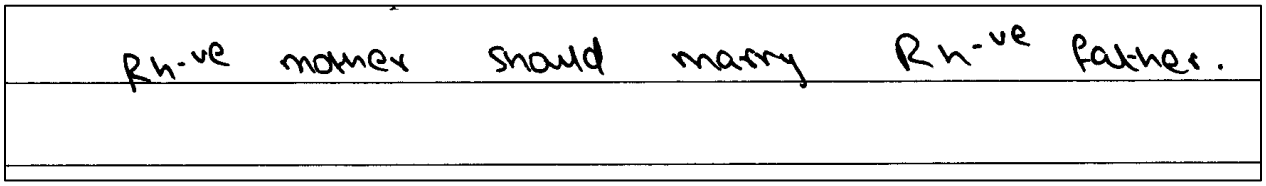
Example:


This condition can be prevented by injecting the Rh-antiserum in the mother's body before and after birth of the baby.

Weaker responses showed candidates' lack of understanding of maternal-foetal Rh incompatibility, therefore, in most cases, candidates could not reach the correct answer. Such responses mentioned irrelevant answers such as Rh negative women marry Rh negative man or vice versa/ blood transfusion of mother, etc.

It is advised to inculcate these concepts through case studies which help in better understanding of concept.

Example:



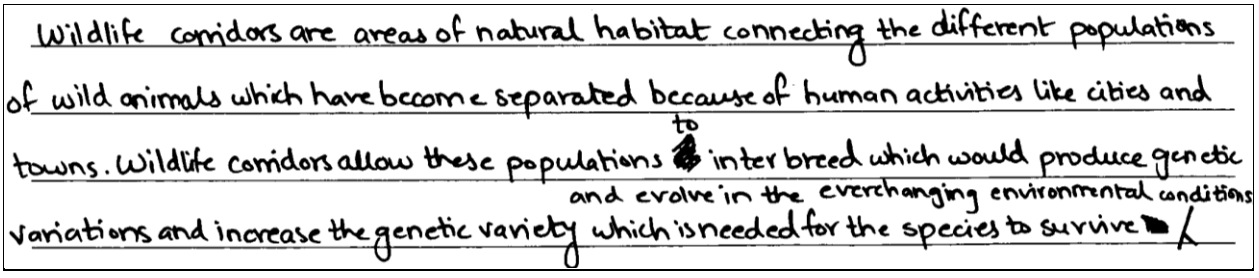
Question 6c:

The International Union for the Conservation of Nature (IUCN) issues the yearly Red List of Endangered Species and provides conservation plans for the protection of endangered animals. One of the conservation plans is protection of wildlife corridors.

How can wildlife corridors decrease the risk of extinction of endangered animals?

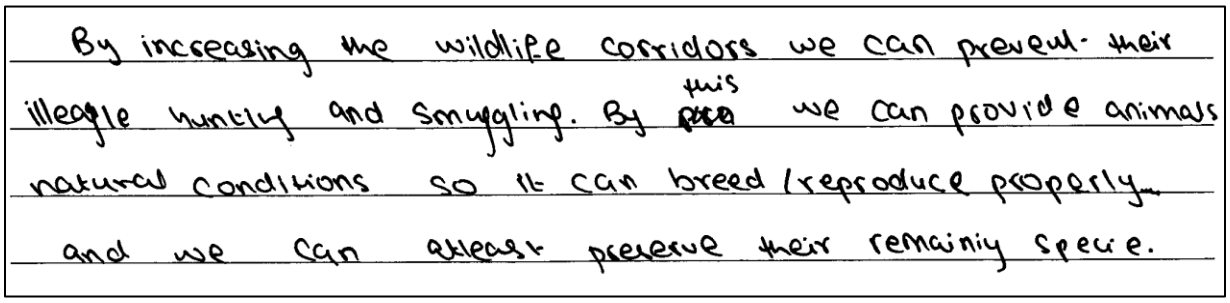
Better responses reflected good understanding of wildlife corridors and their importance. Such responses gave correct description of the role of wildlife corridors to decrease the risk of extinction of endangered species, i.e. wildlife corridors allow movement of animals between natural areas thus providing alternate habitats and maximum chances of increase in population, and they also act as genetic trap or sink.

Example:



Weaker responses reworded the stimulus in their answer without much added value; such as, they mentioned about protection and conservation of endangered species and biodiversity. There was a wide range of low scoring responses; from the very generalised to vague, i.e. prevention of wildlife from hunting/ smuggling/ wildlife breeding in zoos and safaris and protection of national parks/ dissemination of awareness about conservation. Candidates lost marks as they were not specific in their responses.

Example:

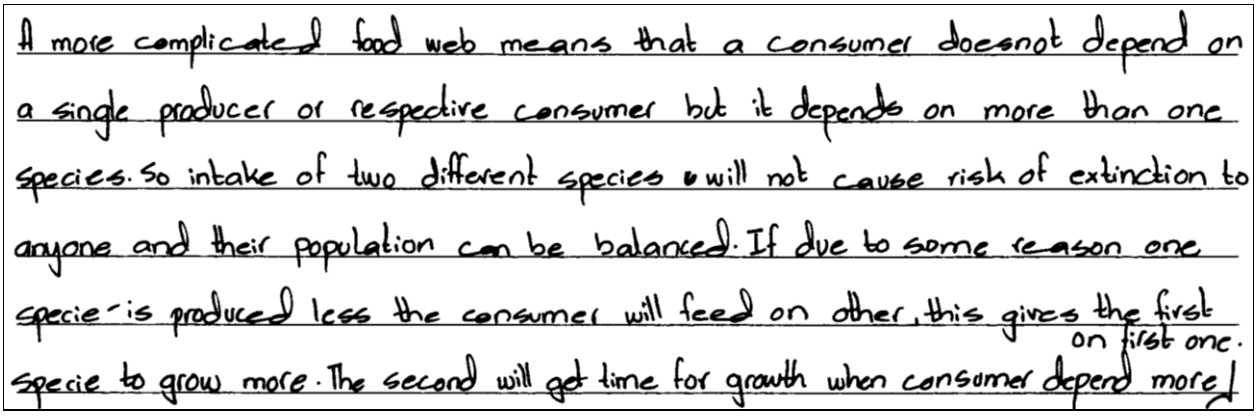

By increasing the wildlife corridors we can prevent their illegal hunting and smuggling. By this we can provide animals natural conditions so it can breed / reproduce properly and we can atleast preserve their remaining specie.

Question 7a:

'The more complicated a food web, the more stable the community is.' How?

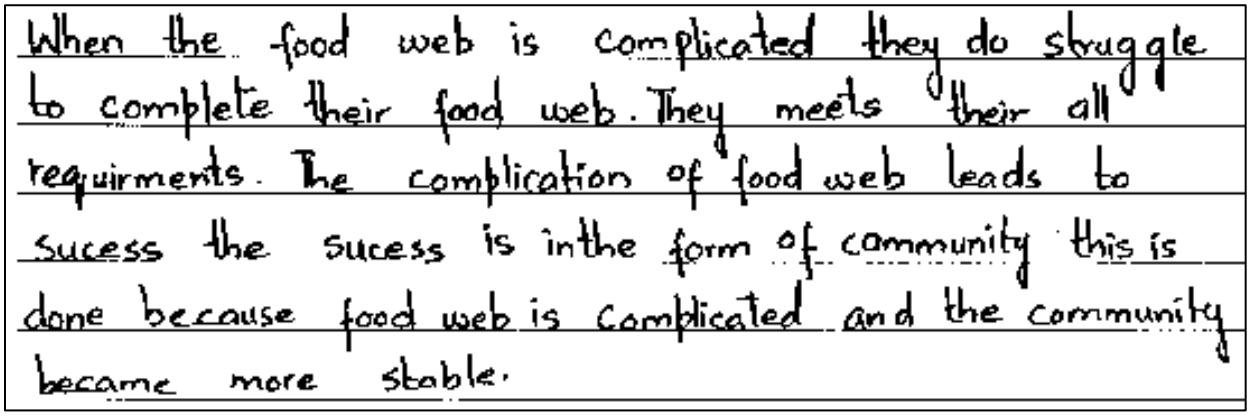
Better responses exhibited good understanding of the stimulus. Candidates were able to relate the stability of a community with more complicated food web. These responses were successful in unpacking the key term 'complicated food web' and hence reached the correct description, i.e. complicated food web offers large variety of living organisms and if the number of one the organisms fall, the consumers have a choice to eat some other organism. There will be less competition among organisms and they might reproduce more successfully.

Example:


A more complicated food web means that a consumer doesnot depend on a single producer or respective consumer but it depends on more than one species. So intake of two different species will not cause risk of extinction to anyone and their population can be balanced. If due to some reason one specie is produced less the consumer will feed on other, this gives the first on first one. specie to grow more. The second will get time for growth when consumer depend more

Weaker responses showed that candidates struggled to understand the key point, i.e. 'complicated food web' in the stimulus, and hence were unable to relate the stability of community with more complicated food web. Such responses described the food web and its components/ flow of energy in a food web.

Example:


When the food web is complicated they do struggle to complete their food web. They meets their all requirments. The complication of food web leads to sucess the sucess is inthe form of community this is done because food web is complicated and the community became more stable.

Question 7b:

Diagram I represents the condition of an area after a volcanic eruption and diagram II depicts the condition of the same area after ten years.

I

II

Identify the type of succession in the given scenario with a reason.

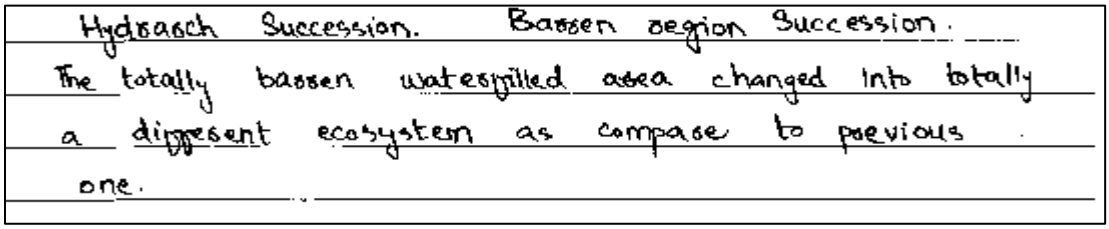
Better responses were able to relate both diagrams to identify the type of succession correctly. Such responses provided the valid reason for their identification. This depicts the sound understanding of concept.

Example:

This is a primary succession, because this area doesnot have any flora or fauna previously, but after volcanic eruption, the nutrients were released which ~~invited~~ invited different species to inhabit here and gradually form a climax community.

Weaker responses gave vague identification of the scenario. However, a few responses presented correct identification but lost marks because they were not specific in reasoning.

Example:

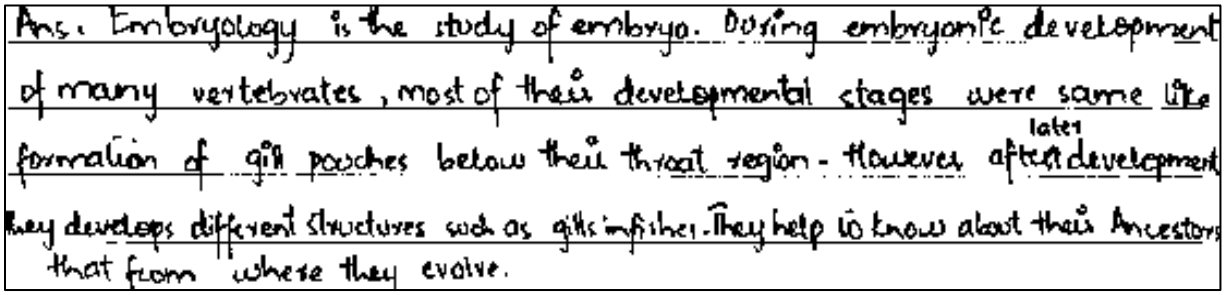

Hydrosach Succession. Bassen region Succession.
The totally bassen watersgilled asea changed into totally a diffesent ecosystem as compase to paevious one.

Question 8a:

How can comparative embryology prove to be an evidence of evolution?

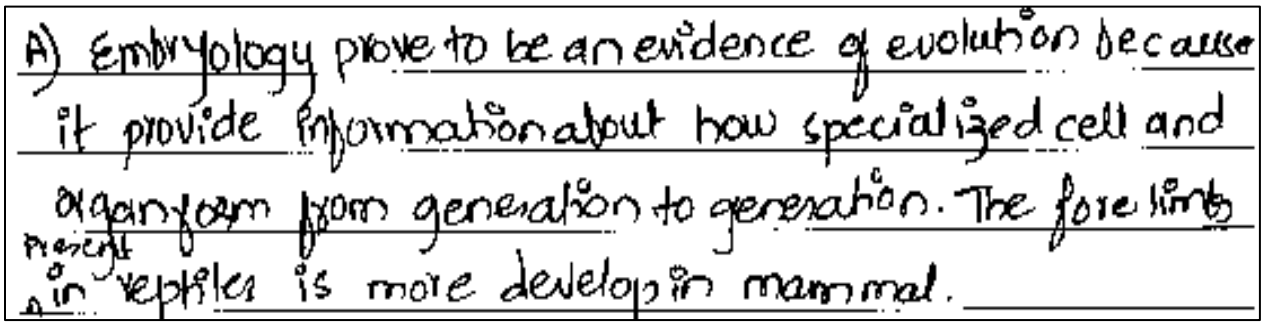
Better responses correctly described comparative embryology as evidence of evolution. Moreover, these responses validated description through example such as all vertebrate embryos go through a stage in which they have gill pouches on the sides of their throats and in the embryo of fish, salamander, monkey and man similarities are more apparent than differences.

Example:


Ans: Embryology is the study of embryo. During embryonic development of many vertebrates, most of their developmental stages were same like formation of gill pouches below their throat region - However after later development they develops different structures such as gills in fishes. They help us to know about their Ancestors that from where they evolve.

Weaker responses defined the term embryology. Some other weaker responses presented very brief and generalised description such as 'comparative embryology compares the different embryos of animals'. These responses failed to trace the common ancestry/ origin of animals. Candidates are advised to learn such topics through examples.

Example:


A) Embryology prove to be an evidence of evolution because it provide information about how specialized cell and organism form generation to generation. The fore limbs present in reptiles is more develop in mammal.

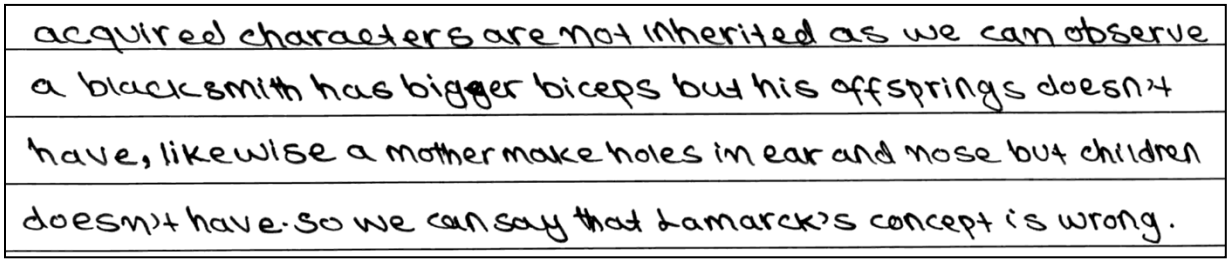
Question 8b:

The transmission of acquired characters is a concept of the Lamarck's theory of evolution.

Justify the rejection of the given concept of the theory using any TWO examples from your observation.

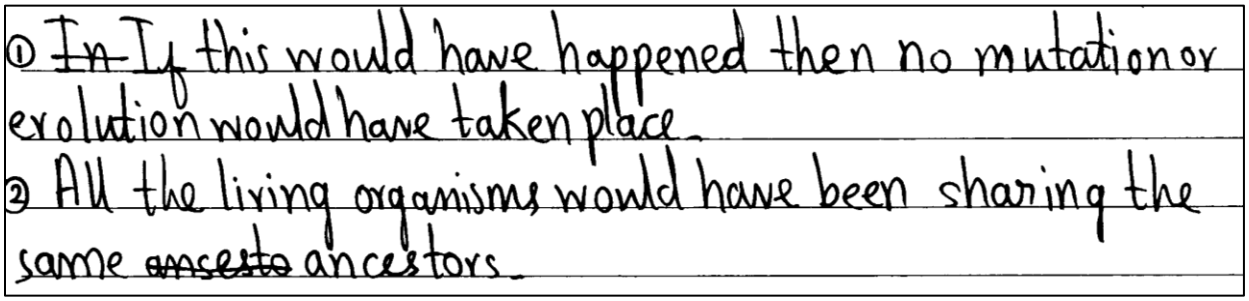
Better responses used appropriate examples to justify the rejection of inheritance of acquired characteristics such as mutations as result of accidents and diseases are not inherited/ boring of hole in ears and nose of mothers is not inherited in new born babies/ circumcision observe in some cultures does not inherit, etc.

Example:


acquired characters are not inherited as we can observe a blacksmith has bigger biceps but his offsprings doesn't have, likewise a mother make holes in ear and nose but children doesn't have. So we can say that Lamarck's concept is wrong.

Weaker responses failed to give appropriate examples and gave ambiguous answers such as acquired characteristics do not inherit. Some other weaker responses described Lamarck's theory of inheritance without mentioning any example.

Example:


① ~~In~~ If this would have happened then no mutation or evolution would have taken place.
② All the living organisms would have been sharing the same ~~ansesto~~ ancestors.

Question 9:

Name and differentiate between the grassland in tropical and temperate climates.

	Temperate Climate	Tropical Climate
Name		
Difference		

Better responses correctly stated names of grasslands in temperate and tropical climates, i.e. Prairies and Savana and mentioned the correct differentiating point(s).

	Temperate Climate	Tropical Climate
Name	Prairies	Savana
Difference	grasslands are without tress	grasslands are with tress

Weaker responses wrongly named tropical and temperate climate of grasslands and hence, were unable to differentiate correctly. It is evident from most of the low scoring responses that candidates were careless in reading the question because these responses stated names of other ecosystems such as tundra and boreal, whereas, question focuses on grassland in different climatic conditions.

Example:

	Temperate Climate	Tropical Climate
Name	Fiona.	Tundra.
Difference	The soil here is less moist because of the less precipitation level and high evaporation level.	The soil here is more moist because of the high ~~precipetate~~ ~~precip~~ precipitation level and low evaporation level.

Extended Response Questions (ERQs)

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

In question 10, most candidates chose to attempt part 'a'. This shows their interest and better understanding of 'mechanism of thermoregulation through negative feedback system' as compared to the understanding of 'human nervous system' which was asked in part 'b'. Similarly, in question 11 part 'b' was preferred over 'a'. This indicates that candidates are more confident in understanding of ecology than pattern of X-linked recessive disease inheritance.

Question 10a:

i. Classify the following animals on the basis of source of heat production for thermoregulation.

- Reptiles
- Bats

ii. Describe thermoregulation with reference to the negative feedback mechanism that takes place in the human body after a vigorous exercise.

Better responses correctly classified reptiles and bats as ectotherms and heterotherms animals. This demonstrates good understanding of classification of animals on the basis of source of heat.

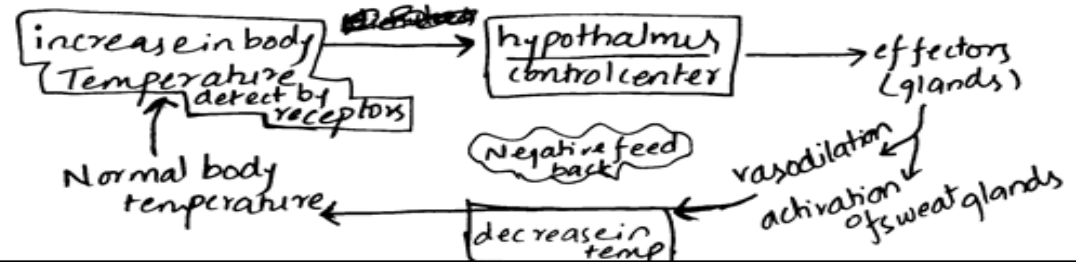
In the second part better responses articulated their answer very efficiently to describe each component of negative feedback mechanism for thermoregulation after vigorous exercise, i.e. after vigorous exercise body temperature increases, brain or thermostat in hypothalamus activates cooling mechanism such as skin blood vessels dilate (vasodilation) to radiate heat from skin surface and sweat glands activates to increase evaporation for cooling; thus, decreasing the body temperature.

Example:

(a) (i) These organisms classify as following.

- Reptiles :- are ectotherms which produce their own small amount of heat that quickly shares with the enviroment. SO they absorb heat from their sorroundings. Example lizard take heat from surrondings by moving to the exposure to sunlight.
- Bats are heterotherms that are capable of varying degrees of endothermic heat production but donot regulate their body temperature within narrow range.

(b) During vigorous activity, like exercise man used alots of his glucose. The breakdown of glucose produces a large amount of heat so after a vigorous activity man body will start negative feed back mechanism to release the heat produced in the body. Negative feed back mechanism refers to the diminution of a effect by its influence on the process giving rise to it (1) A heat production in a body starts this mechanism by sending this stimulus to hypothalmus where thermosensitive receptors detect this stimulus (2) After recieving stimulus hypothalmus sends message to the effectors for response (3) The effectors include hormone glands that give a respone by the vasodilation of arteries in skin. This vasodilation makes maximum flow of blood to the skin so maximum heat will loss from skin. (4) The message will also brought to the sweat gland that starts its secreations, thus giving an cooling effect by evaporation of sweat. (5) The temperature of body reduces or heat loss from the body give stimulus to the hypothalmus about lowering of temp. thus hypothalmus stops sending signals to effectors.



Weaker responses demonstrated a general trend in incorrect classification of reptiles and bats as endotherms/ homeotherms / warm blooded and cold blooded animals. Such responses failed to understand the part of question which tells about the criterion for the classification of given animals, i.e. classification on the basis of their source of heat production. It is recommended to use examples from daily life to inculcate an understanding of such kind of topics. For example, reptiles such as lizards bask in the sun because they absorb heat energy from their environment/ use external sources of temperature to regulate their body temperatures; therefore, they are classified as ectotherms. Ectotherms are colloquially referred to as cold-blooded even though their body temperatures often stay within the same temperature ranges as warm-blooded animals.

In the second part weaker responses depicted candidates' inability to describe the mechanism of thermoregulation after vigorous exercise through negative feedback mechanism. Most of the responses failed to connect the situation in the given stimulus with its correct mechanism of thermoregulation. Hence, such responses provided ambiguous and generalised description of thermoregulation such as erection of hair/ reduction of blood flow towards skin/ accumulation of subcutaneous fat etc.

Example:

a. Thermoregulation:- Maintaince of internal temperature according to surroundings.

• Reptiles:- Reptiles include many insects, lizard etc. They maichain ther temperature by many skin present upon them. The skin helps these animals to ~~eas~~ be safe in regulating temperatures.

• Bats:- Bats also face regulating temperatures around them. Main way of protecting themselves is the wings which protect bats in several ways. During heat production, these flying animals, have protective layer of skin around them.

2) Whenever a human done any vigorous exercise, which include the movement of overall body. The negative feedback mechanism occurs. Negative feedback mechanism controls the amount of heatbeat which is increased after the exercise. It shifts the body in opposite mechanism, in which ~~heat~~ heart rate slowed down, Temperature of the body falls down and Internal body function comes at constant level.

Question 10b:

The given diagram depicts a stressful condition where a dog is running after an officer. After running for 20 minutes, he is rescued and he gets out of this stressful condition.

i. Describe the effects of stimulations of sympathetic nervous system on the liver, cardiac muscles, pancreas and adrenal medulla of the officer.

ii. Describe any THREE roles of parasympathetic nervous system in the relaxed situation when the officer is rescued.

Better responses revealed accurate understanding of the stimulus and key terms given in the question. Such responses correctly described the effects of stimulations of sympathetic nervous system on the liver, cardiac muscles, pancreas and adrenal medulla. Moreover, this description was further elaborated by giving an account of the purpose of physiological changes, e.g. increase in glycogenolysis to provide maximum energy to the body, increase in heart rate to maximum distribution of oxygen to the muscles, pancreas to promote glucagon secretion for maximum energy and secretion of epinephrine and norepinephrine to prepare for emergency situations.

Better responses smartly used the information given in the first part of the question, i.e. effect on liver, cardiac muscles, pancreas and adrenal medulla to write their answer with respect to parasympathetic nervous system. Such as to increase glycogen synthesis and bile secretion by liver, decrease the cardiac muscle contraction, increase the secretion of digestive enzymes from the pancreas and insulin and no effect on the adrenal medulla.

Example:

Effects of Stimulations of Sympathetic nervous system on the liver, The liver § convert glycogen into glucose.

Cardiac muscles :- The cardiac muscle contract and relax more rapidly and more pump of blood and high blood pressure is occur. The blood supply to other part body is more speed as compare in a normal condition.

Pancreas α cell are stimulate by Sympathetic nervous system to produce glycogen hormone which convert glycogen into glucose for the energy. Adrenal medulla when stimulate it secread secread two types of hormone ardenlin and non-adenlin hormone which fight against stress & condition e.g dilation of pupil, more skeletal muscles relax and contraction, more supply of blood vessel present in skin etc.

The role of parasympathetic nervous system in the relax situation.

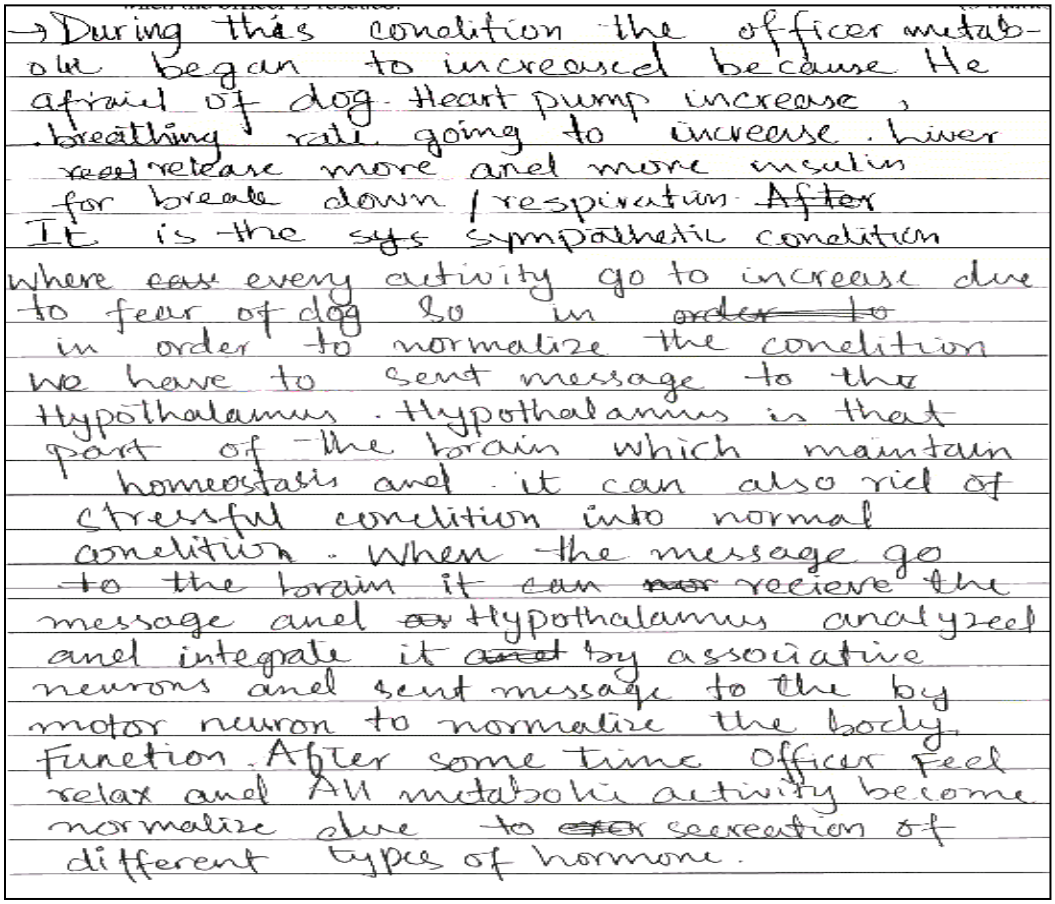
1. It normal the metabolic activities of body and muscles relaxtion and contraction.
2. It normal the heart beat by normally of cardiac muscle activities.
3. Control and normal the breathing rate of person.

Weaker responses indicated lack of understanding of the given situation and thus provided rote-learned or generalised description of sympathetic nervous system such as sympathetic system is one of the divisions of autonomic nervous system/ it prepares body for emergency situations/ it maintains homeostasis in the body, etc. Some other responses gave incorrect physiological changes such as sympathetic nervous system affects liver, increases bile secretion, pancreas to increase digestive enzymes.

In the second part weaker responses exhibited confusion between role of sympathetic and parasympathetic nervous system. However, the demand of the question was very explicit; i.e. 'to describe the role of parasympathetic nervous system in the relaxed situation when the officer is rescued'. This indicates cursory reading of the question which led to poor performance.

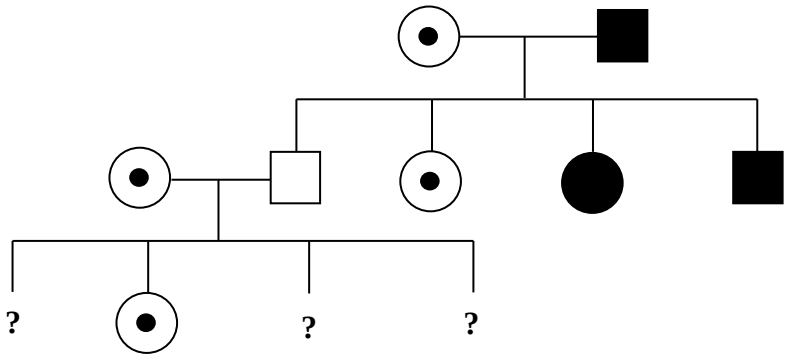
A general trend was evident from weaker responses, i.e. candidates provided memorised general description of sympathetic and parasympathetic nervous system; irrespective of the given stimulus. Hence, it is advised during classroom practice to connect examples from daily life for encouraging a better understanding of the topic.

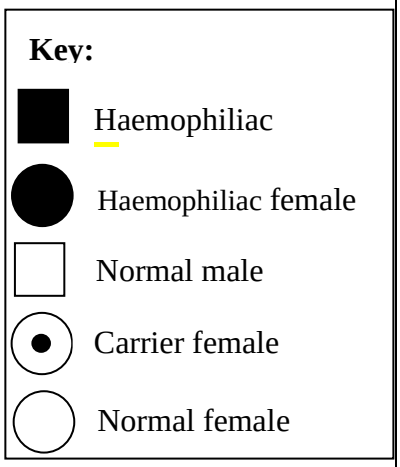
Example:


→ During this condition the officer metabolic began to increased because He afraid of dog. Heart pump increase, breathing rate going to increase. liver ~~reed~~ release more and more insulin for break down / respiration. ~~After~~ It is the ~~sys~~ sympathetic condition where ~~can~~ every activity go to increase due to fear of dog so in ~~order to~~ in order to normalize the condition we have to sent message to the Hypothalamus. Hypothalamus is that part of the brain which maintain homeostasis and it can also rid of stressful condition into normal condition. When the message go to the brain it ~~can not~~ receive the message and ~~as~~ Hypothalamus analyzed and integrate it ~~and~~ by associative neurons and sent message to the by motor neuron to normalize the body function. After some time officer feel relax and All metabolic activity become normalize due to ~~eff~~ secretion of different types of hormone.

Question 11a:

The given pedigree shows the inheritance of haemophilia





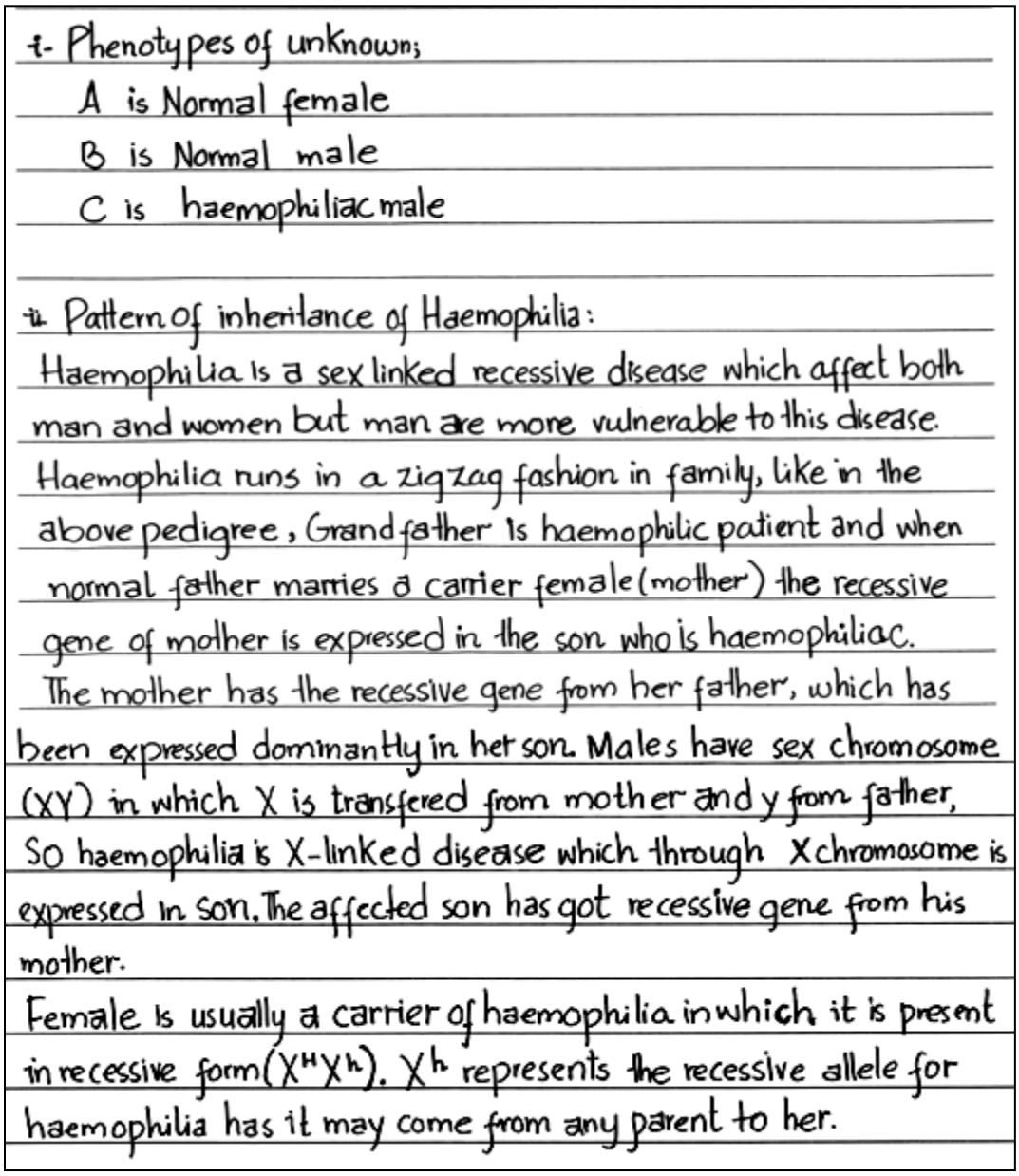
i. Identify the phenotypes of the unknown offspring in the given pedigree.

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 offspring.

Better responses precisely articulated the pattern of inheritance of haemophilia in males and females. Such responses demonstrated extensive understanding of haemophilia as an X-linked recessive disease.

Example:



i- Phenotypes of unknown;

A is Normal female

B is Normal male

C is haemophiliac male

ii- Pattern of inheritance of Haemophilia:

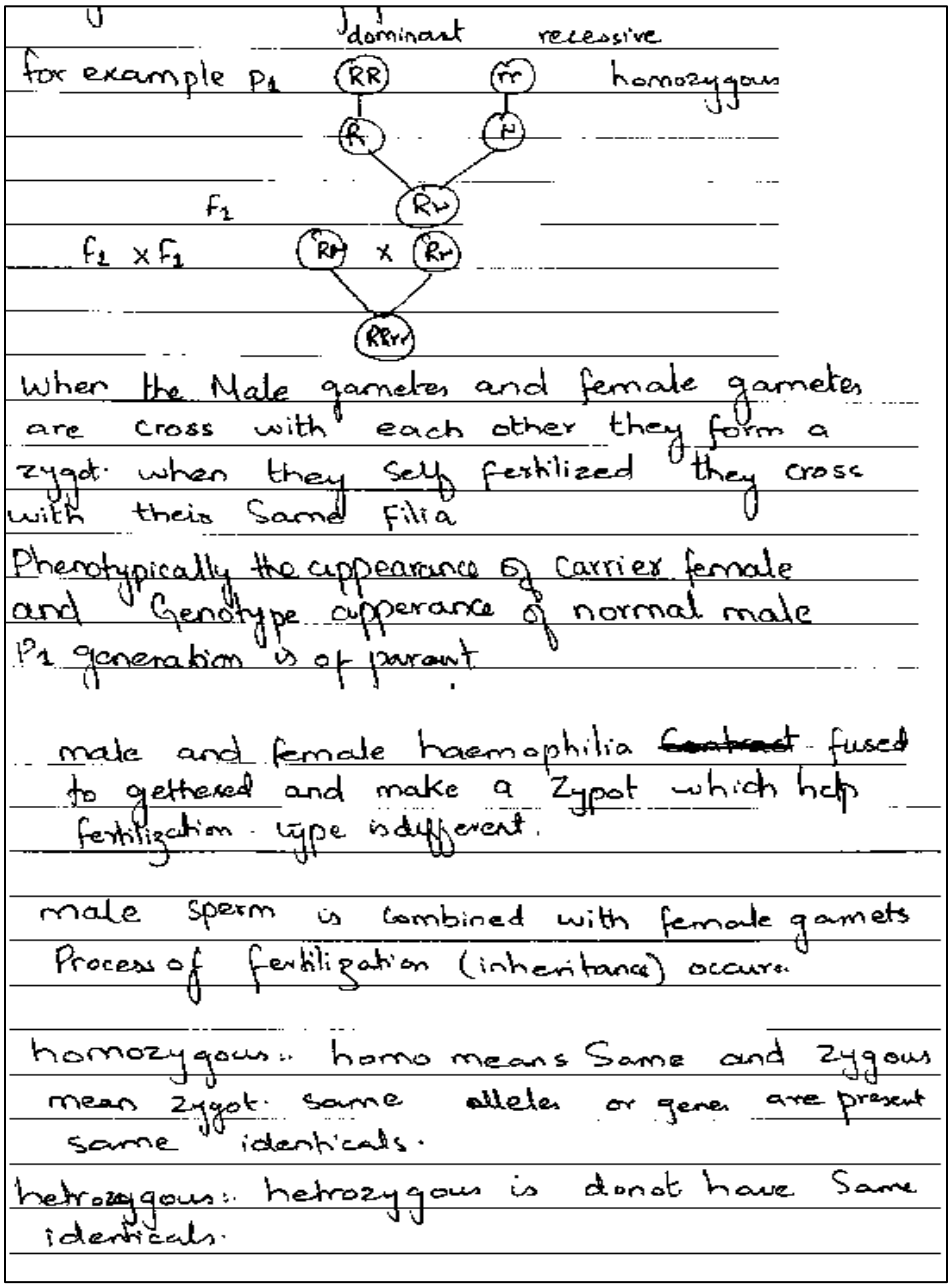
Haemophilia is a sex linked recessive disease which affect both man and women but man are more vulnerable to this disease. Haemophilia runs in a zigzag fashion in family, like in the above pedigree, Grand father is haemophilic patient and when normal father marries a carrier female (mother) the recessive gene of mother is expressed in the son who is haemophiliac. The mother has the recessive gene from her father, which has been expressed dominantly in her son. Males have sex chromosome (XY) in which X is transfered from mother and y from father, So haemophilia is X-linked disease which through X chromosome is expressed in son. The affected son has got recessive gene from his mother.

Female is usually a carrier of haemophilia in which it is present in recessive form (X^HX^h). X^h represents the recessive allele for haemophilia has it may come from any parent to her.

Weaker responses incorrectly identified the phenotypes of offspring as haemophilic female, normal male and normal female. Most of the other responses made random guesses which was indicative of their lack of understanding.

Weaker responses failed to describe the pattern of inheritance because of the lack of understanding of the key concept of haemophilia as sex linked recessive disease. Such responses described the condition, symptoms and treatment of haemophilia which was not the demand of the question. Some other weaker responses correctly mentioned the genetics of haemophilia but were unable to describe the pattern of inheritance.

Example:



When the Male gametes and female gametes are cross with each other they form a zygot. when they self fertilized they cross with their Same Filia

Phenotypically the appearance of carrier female and Genotype apperance of normal male P1 generation is of parent.

male and female haemophilia ~~Contract~~ fused to gethered and make a Zygot which help fertilization type is different.

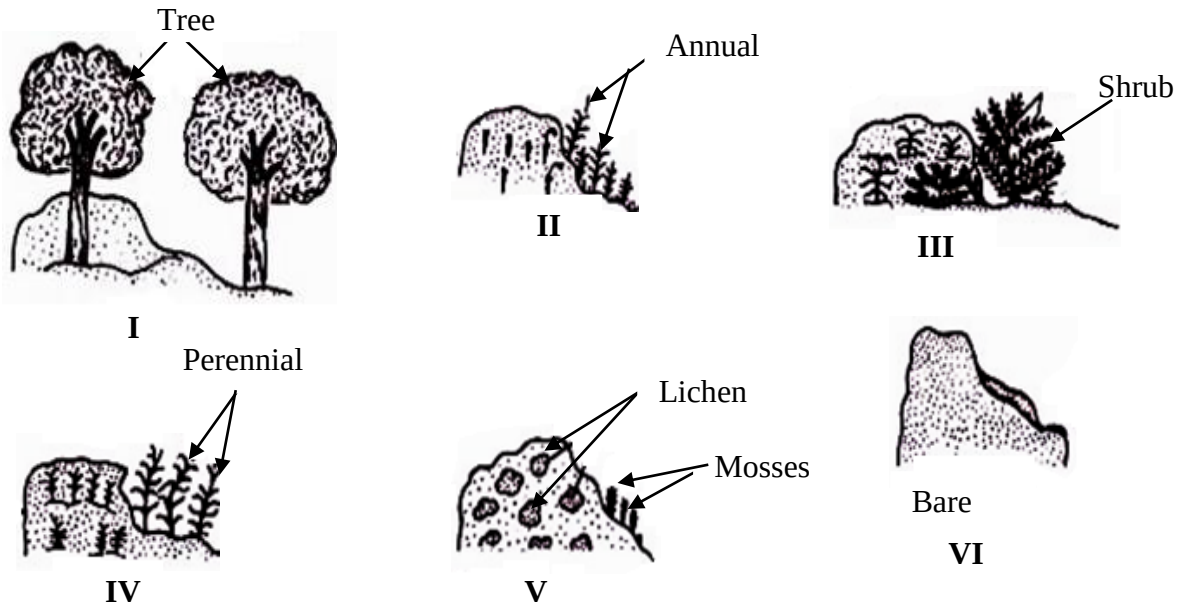
male sperm is combined with female gamets Process of fertilization (inheritance) occure.

homozygous:: homo means Same and zygous mean zygot. same alleles or gene are present same identicals.

hetrozygous:: hetrozygous is donot have Same identicals.

Question 11b:

The given diagrams show different stages involved in xerarch.



i. Identify and arrange the given stages in their correct order.

ii. Describe the features of any THREE of the given stages.

Better responses correctly identified and arranged the given stages of xerarch.

Better responses were able to describe the features of different stages due to better understanding of given diagrams. Most frequently described stages were crustose lichen stage, shrub stage and climax forest.

Example:

I (Bare rock), II (Lichens and mosses), III (Annual Grass), IV (Perennial grass), V, (Shrubs), VI (trees)

Moss Stage: ~~in xerosere Succession / Stage~~

① When mosses arive, their is presence of moisture, soil is formed for anchorage for plants and soil has organic matter due to litter of lichens making the soil fertile and promoting growth. Substratum development had occured. (continued next page)

② Shrub stage:

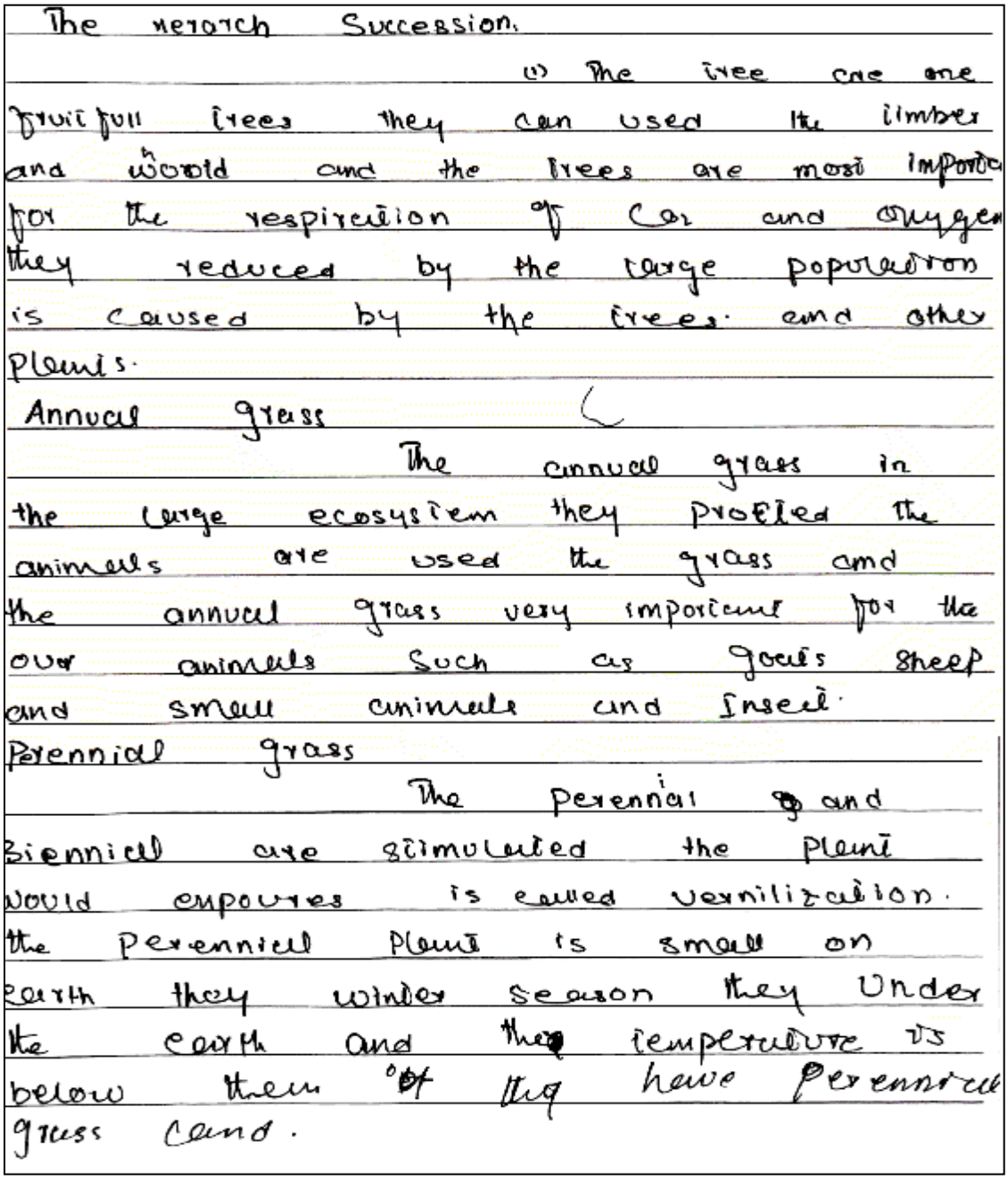
Plants shorter than trees called shrubs when invade the area, the soil is rich in organic matter, moisture is present and soil provides anchorage for plants, the shrubs overshowdow the mosses thus reducing the light coming to them and hence retards their growth by photosynthesis eventually leading them to death, the death of mosses further enriches the soil. Substratum development has occured already.

③ Climax Community: It is the most stable community of organisms present with respect to time. Trees have grown which are tall and have all necessities required for survival such as moderate climate or temperature, rich and fertile soil for growth which is due to the deposition / decomposition of Organic matter by bacteria making the soil rich in nutrients required for growth. The soil provides the site of anchorage and has maximum water holding capacity.

Weaker responses incorrectly identified and arranged different stages involved in xerarch and displayed poor understanding of the diagrams given in the stimulus.

Weaker responses gave irrelevant descriptions of stages because most candidates were unable to identify the stages correctly. Some other weak responses mentioned name of stages but failed to give correct description.

Example:



The xerarch Succession.

① The tree are one fruit full trees they can used the timber and world and the trees are most importa for the respiration of Co_2 and oxyge they reduced by the large popuration is caused by the trees and other plants.

Annual grass

The annual grass in the large ecosystem they protied the animals are used the grass and the annual grass very imporiant for the our animals such as goats sheep and small animals and Insect.

Perennial grass

The perennial and Biennial are stimulated the plant would empoures is called vernilization. the perennial plant is small on earth they winter season they Under the earth and the temperature is below them of the have perennial grass land.