Aga Khan University Examination Board Notes from E-Marking Centre on HSSC-II Biology Examination May 2018

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 2018 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 were also weak. However, candidates outdid in the concepts of thermoregulation, i.e. thermoregulation according to the habitat of animals, endocrinology (effects of hyper-secretion and hyposecretion of different hormones and their effect on the body), and Darwin's theory of evolution, major ecosystems and types of interaction in ecosystem. Nonetheless, 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. Mechanism of muscle contraction
- b. Mendel's law of independent assortment
- c. Gene therapy
- d. Difference between ovarian cycle and uterine cycle

Detailed Comments:

Constructed Response Questions (CRQs)

Question 1a:

The given diagrams represent two types of foxes. Fox X lives in warm climatic conditions while fox Y lives in cold climatic conditions.





Fox X

Fox Y

- a. Identify any TWO features of fox X adapted to warm climatic conditions.
- b. How do the features identified in part 'a' adapted to warm climatic conditions?

Better responses wisely used the diagram to identify the correct features of fox X adapted to warm climatic conditions. Such responses identified the features that are apparent in the diagram, for example, presence of large ears as compare to the fox Y, fur layer on the body is comparatively thin, body is relatively covered with short hair and body is comparatively slim.

Many of the candidates also mentioned credit worthy features that are not apparent in the diagram such as relatively thin subcutaneous fat/ relatively light coloured body fur/ nocturnal life style/ panting etc.

In the second part of the question, better responses correctly described the way or mechanism by which the identified features help to adapt in warm climatic conditions, such as presence of large ears as compared to the fox Y to radiate large amount of heat/vasodilation, thin layer of fur/ short hairs on the body is to trap less amount of air, comparatively smaller body size is to decrease metabolic rate so that less amount of heat is produced, thin layer of subcutaneous fat is to reduce insulation/ light coloured fur is reflect light. Example (a):

body of the fox X The fur around the not thick úŚ fox Y. It is a bathin layer to as , expanded compared łox the cold condition Ln fox

Example (b):

fur) means there would be no insulating layer UThin. covering and air will not be trapped within the fur so heat is cool in the warm The animal will remain can be radiated from body sur condition as heat environment The expanded ears will also for the removal of heat ox the vasodilation.

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.

Many of the candidates failed to score good marks in the second part of the question; because, these candidates did not describe the way through which the identified features help in adaptation to the warm climatic condition. Such responses exhibited lack of relevancy with the given stimulus and with the question.

Example (a):

1. Presence of fur or hair. (mammals), sweat glands. 2. warm blooded. Presence of epidermis, Thermoreceptors are present that detects the Femperature. Well develops Nervous system

Example (b):

identified the features as in warm conditions we the ir will be Mose rainfall while having humidal So more intrake of more and exceetion of usine as they will excrete but more asine help them to balance In their body box surviving in envisonment. they liv which Balance their body regulation. In isotonic envisorment.

Question 2a:

The following table shows the approximate concentration of glucose and urea in the renal artery and the renal vein.

	Concentration in the Renal Artery (mg/dL)	Concentration in the Renal Vein (mg/dL)
Glucose	70	70
Urea	20	10

Give reason for

- i. equal concentration of glucose in the renal artery and the renal vein.
- ii. less concentration of urea in the renal vein as compared to the renal artery.

Better responses correctly mentioned the reason of equal concentration of glucose in the renal artery and the renal vein, i.e. due to the reabsorption of glucose molecules in the proximal convoluted tubule of nephron.

Similarly, better responses correctly mentioned the reason of less concentration of urea in the renal vein as compared to the renal artery, i.e. because urea is removed/ excreted in the form of urine/ urea is excreted from the collecting duct or limited reabsorption of urea in collecting duct.

Example (i):

As the guicose that entered the kidney through renal artery was reabsorbed during convulated of tube so same concertation guiose was jourid in reval view. the process of reabsorption in the moximal of

Example (ii):

because used being the nitrogenous waste was sent to the collecting duct to be removed from the body. As a result the broad that left the kidney through wien had less used because used comprised the usine and was removed through collecting ducts.

Weaker responses revealed candidates' carelessness in reading the stimulus and question, which led to misinterpretation of the given stimulus. In the first part of the question, most of the candidates mentioned the benefits of glucose or the process of filtration in the nephron; similarly in the second part of the question, toxicity of urea was described.

Example 1:

Chlucose molecules are large in size and co are not ultratiltrated in the glomerulus ii. Glomerulus is present between renal vein and renal astery. utbrakthration in it results in the deposition of usea in bowman's capeute

Example 2:

Absorbtion of glucose abosint occurs in that's why its concentration is same ıi. ひくしひ のうつつ <u> 9000 - 2165</u> ちちい うろん ancentra

Question 2b:

Adnan is diagnosed with hyper-secretion of glucocorticoids in his body.

Mention TWO physiological effects of hyper-secretion of glucocorticoids on Adnan's body.

Better responses correctly mentioned the physiological effects of hyper-secretion of glucocorticoids such as weakening of muscles and bones due to excessive breakdown of proteins/ increase in the blood glucose level that my result in diabetes/ low protein level in the body/ buffalo hump/ obesity/etc.

Example:

- Exercise breakdown of grandosse protein as a result reading
to bone and muscle weakness
High amount of quiese in blood which will disturb
numul metabolic activities just like diabetes mellitus

Weaker responses mentioned irrelevant and generalised answers such as weakened body/ lethargic body/ high fever/ illness/ nausea etc. Many of candidates misinterpreted the key term 'hyper-secretion' and stated effect of hypo-secretion; like, decreased metabolism of proteins.

Example 1:

Weakness colour becomes change.

Example 2:

a may become satal in laverino



Better responses exhibited familiarity with different forms of chromatin; therefore, were able to correctly identify diagram that shows the transcriptionally active chromatin, i.e. diagram I. Furthermore, these responses correctly provided reason of their identification by stating the loosely packed nucleosomes/ exposed DNA/ uncondensed DNA/ less coiled DNA which facilitates the transcription etc.

Example:

Euchromatin (Diagram I) show it more transcriptionally active than Heterochromatin (Diagram I) because it show open configuration and due to which its DNA is expressed and transcription can be takes place easily

Weaker responses were unable to identify the transcriptionally active chromatin may be due to unfamiliarity with the diagram. This also revealed the candidates' weaker concepts in understanding the structure of DNA and relating the structure of DNA with the process of transcription.

Diagram I will be more	actize .	transcrip	hisnally
because they are near of	close to	each off	erd
Perhactly coil which nears	they have	strong	hydrogen
bonds.	0	. (<u> <u> </u></u>

Question 3b:

While travelling from nucleus to the cytoplasm, newly synthesised messenger ribonucleic acid (mRN (mRNA) in eukaryotic cell encounters different degrading enzymes.

How is this mRNA modified to protect itself from the degrading enzymes?

Better responses correctly drafted the way through which mRNA is modified to protect itself from the degrading enzymes by stating the addition of a 'cap'or 7 methyl GTP and a 'tail'/ poly-A tail while travelling from nucleus to cytoplasm.

Example:

To protect mRNA trom degradation head in the form of 7-methyl
hTP is added to it 5' to 5! Moreover tail is added at its terminal
part at 3' and which is poly ademy late tail. This head and tail
assist mRNA in traveling from nucleus to cytoplasm but not in Abokanyches
where mRNA has to travel very small distance without any danger.

Weaker responses misinterpreted the given stimulus in the question and described the structural features of mRNA. Such responses also revealed candidates' lack of understanding of the process of transcription.

Example:

ai z (AURM tespinal) pinal pinal pina
attached from the Ant on the other and.
These are long & coiled which prevents
from Segradation.

Question 4a:

When nervous stimulation at neuromuscular junction stops,

- i. what will be the action of tropomyosin molecules?
- ii. what will be the result of action of tropomyosin molecules on the myosin heads?
- iii. which organelle will store calcium ions?

Better responses showed clear understanding of the mechanism of muscle contraction starting from the nervous stimulation to the completion of cross-bridge cycle. Such responses used appropriate biological vocabulary related to the mechanism.

In the first part of the question, better responses stated the blockage of the binding sites present on the actin filament by tropomyosin.

In the second part of the question, better responses correctly mentioned the effect of the action of tropomyosin molecules on the myosin heads by stating the inability of myosin head to bind with actin filament/ detachment of myosin head.

In the third part of the question, better responses correctly named the organelle that is sarcoplasmic reticulum.

Example:

Tropomyosin will not expose the myosin-binding sites
& with actin and no cross bridge will form. They will not
be displaced by troponin.
ii. what will be the result of action of tropomyosin molecules on the myosin heads? (1 Mark) When Cross-bridge is not formed so their is no muscular
contractions. Myosin & head do not attach to actin filament
to activate cross bridge cycle.
iii. which organelle will store calcium ions? (1 Mark)
Sarcoplasmic reticulum will store calcium ions (ca2+).
This means there would be low level of car ions in 6100d.

Weaker responses failed to relate the effect of nervous stimulation at the neuromuscular junction with the cross-bridge cycle, therefore, were unable to provide correct answer. This also revealed candidates' rote learning of mechanism of muscle contraction. Moreover, most of the candidates did not use specified scientific vocabulary relevant to the mechanism such as endoplasmic reticulum was mentioned instead of sarcoplasmic reticulum.

Example 1:

As proposin shifts to proposingesin to enpose Actin but it will fail to expose Artin as nervous simulation stops what will be the result of action of tropomyosin molecules on the myosin heads? (1 Mark) ii. So as a sesult attachment tropomyosin be attached to the bulbulus/ nijosio not which organelle will store calcium ions? (1 Mark) īii. store the calcion ionsarcomerewill

Example 2:

(1 Mark)
(1 Mark)
(† Mark)

Question 4b:

Which part of a plant contains intercalary meristematic tissues? What is the function of intercalary meristematic tissues?

Better responses correctly identified the part of plant which contains intercalary meristematic tissues, i.e. bases of internodes and also correctly stated their function, i.e. they function in the production of leaves/ flowers.

Example:

inter<u>calary</u> meristematic tissue present on the basis of internades. The <u>Function</u> is they produce <u>fruits</u> and <u>Flower</u>.

Weaker responses displayed candidates' carelessness in reading the question properly. Most of these responses provided detailed description of the function of meristematic tissues in general. Thus, these responses were not able to meet the demand of the question. Moreover, candidates failed to specify the function of intercalary meristematic tissues and gave incorrect functions such as help in gaseous exchange.

Example 1:

Intercatory meristematic times are found in stern of the plant (shoots) (shoot apons. These tissues take part in the growth of plants. Their intercalary air spaces allow orchange of gases betwee the plant cells. gases between

Example 2:



Question 5:

The given diagram illustrates two possibilities of non-disjunction in oogenesis.



- a. What would be the distribution of X chromosomes at meiosis I, if meiosis I takes place normally?
- b. Which types of syndrome will appear in the offspring if a sperm having
 - i. Y chromosome fertilises secondary oocyte A?
 - ii. X chromosome fertilises secondary oocyte B?
- c. What will be the gender of the offspring produced as a result of the fusion of a sperm having X chromosome with the secondary oocyte B?

Better responses displayed clarity in the understanding of chromosomal distribution during meiosis. Furthermore, candidates have properly used the biological vocabulary in the relevant answers.

In part \mathbf{a} of the question, better responses correctly mentioned the distribution of chromosomes, i.e. one X chromosome will move to the secondary oocyte and another X chromosome will move to polar body. Moreover, some other credit worthy responses drew the equal distribution of chromosomes in the polar body and secondary oocyte.

Example (a):

Meiosis I is a reduction division means the number of aromosomer half than that of the parent nuclei so if the meiosis had taken primary orgile would have got 1 chromosome and the normal utich would have I cheomosome other to odai

Better responses of part **b** revealed good knowledge of biological vocabulary such that these responses correctly named each type of syndrome, i.e. Klinefelter's syndrome will appear if a sperm containing Y sex chromosome fertilises secondary oocyte A and Turner's syndrome will appear if a sperm having X sex chromosome fertilises secondary oocyte B.

Example (b):

i. Y chromosome fertilises secondary oocyte A Knilezeurens Syndiame X chromosome fertilises secondary oocyte B? ii. Turners Syndrome

Better responses of part **c** correctly identified the gender, i.e. female.

Example (c):



Weaker responses indicated candidates' lack of understanding of the chromosomal distribution in meiosis and insufficient knowledge of biological vocabulary. Furthermore, some misconceptions were evident such as; polar bodies do not receive chromosomes during the process of meiosis.

Example (a):

I the distribution 95 orrest because pelar possibility ha soon degenerate take past in sepreduction and cent I. the distribution 95 morrest and °s wi youten a which chranosone nen di gail to seen

Example (b):

i. (1 Mark) Y chromosome fertilises secondary occyte ler studione and line nam shind NOME luinei ane. X chromosome fertilises secondary occyte B ii. (1 Mark) lten s SINGIOM -> lime $\partial \partial \omega$ norr

Example (c):

Question 6a:

The given dihybrid cross of pea plant shows the appearance of 50 percent of parental type and 50 percent recombinant type offspring.

Poventa	Round Yellov	W	×	Wrinkled Green	
rarents:	RrYy	:	×	rryy	
Gametes:	RY, Ry, rY, ry		×	ry	
Filial Generation:	RrYy Round Yellow	Rryy Round Green	rrYy Wrinkled Yellow	rryy Wrinkled Green	

i. State the Mendel's law which supports the appearance of recombinant type offspring.

ii. Describe the application of the stated Mendel's law in the given situation.

Better responses exhibited candidates' good understanding of Mendel's law. Such responses smartly interpreted the given situation in the stimulus to reach to the correct answer, i.e. Mendel's law of independent assortment. Furthermore, candidates have correctly described the Mendel's law of independent assortment in the given situation.

Example (i):

The law of independent assortment says "9) two contrasting thaits are followed in the same cross, the alle les would assort independently into gametes

Example (ii):

seed colour and seed shape are determined The genes. It is not necessary that the vellow always appear in the round seed colour or colour will always appear in the wrinkled seed gamete formation, the genes are assortmed so after fertilization may recombinant types i yellow wrinkled seeds and green round seed also appear

Weaker responses reflected candidates' misconception in Mendel's law of independent assortment and Mendel's law of segregation. Many of the candidates incorrectly identified Mendel's law of segregation in the first part of the question. Moreover, in the second part of the question, genetic diversity was explained.

Example 1:



Example 2:

There are two alleles for each trait but affer 1 allele by each traitis left. If these alleles formation same trats would <u> sennized</u> CU(Describe the application of the stated Mendel's law in the given situation. ii. (2 Marks) It described the dominant and recessive alle a gene. ordificial help in Ьí COD gene chara pollination NOSL

Question 6b:

Red coat colour in cattle is codominant with white coat colour. As a result of cross between these two different coloured cattle, all offspring produced have roan colour.

Determine the genotypes of offspring that will be produced as a result of cross between two roan coat coloured cattle.

Better responses correctly demonstrated the genetic cross to determine the genotype of offspring. These responses correctly selected the genotypes of parents such as Rr and Rr, therefore, were able to determine the genotype of offspring, i.e. RR: Rr : Rr : rr. However, some of the candidates demonstrated the genetic cross as a rough work and mentioned the genotype of offspring.



Weaker responses described the phenotypes of parents. Some of the candidates reproduced the stem and others mentioned the resultant phenotypic ratio of expected offspring, i.e. 1:2:1/ one red coat coloured, two roan coat coloured and one offspring with white coat colour. These responses overlooked the key term, i.e. genotype mentioned in the question, therefore, mentioned the phenotypic ratio.

Example:



Question 7a:

- Retrovirus
- RNA version of cloned normal gene
- Culture of stem cells from bone marrow having defective gene

Using the given information, outline the process of gene therapy.

Better responses intelligently used the information given in the stem to draft their answer. Moreover, such responses coherently composed each step with appropriate brief description. For example, the process of gene therapy was outlined in this way. Insertion of RNA version of normal gene into retrovirus/ formation of Recombinant DNA, infect stem cells having defective gene by retrovirus carrying normal gene, insertion of viral DNA carrying normal gene into chromosome of stem cell and injection of genetically engineered stem cells into bone marrow.

one taken bone normow of the pateint ₩e. cels. 1-) 310m RNA vertion mormal deve is transfered of clonned retrovinus 50 normal seavence that He. of material vinus americ incorporated 'n Oł (offsoring) bone manow ŀ۵ allowed infect/ attack 3-) Vivus 19 them openetic material cell. It incorporates its into it. book and returned 4) Juis cell is Han. normal gene. divide producing move cells it vapially

Weaker responses were not able to use the given information properly. However, most of the candidates drafted memorised process of gene therapy. Some other candidates struggled to organise their answers according to the process of gene therapy.

Example 1:

ì۶ the. N-9 ÞKO LERG of Sach 1 a seve (re a ì۶ asyow ٥¢ ene 15 in se JEXSION ΈM. well poduce. It is used doscases

Example 2:

<u>C</u> P	<u> </u>	<u>f</u> ee	CUE	the	defe	CHILL	ge <u>ne</u>
and	then	put	the	Clo	ned	nori	nal gene
or	thé m.	The	RNI	a pa	olyme	rase	епъуме
bind	s the	2	Lone	<u>d n</u>	orma	u g	ene
with	- the	57	Err)	<u>C.e.II</u>	<u></u>		

Question 7b:

- i. What is the genetic basis of cystic fibrosis?
- ii. How are respiratory passages affected in a patient suffering from cystic fibrosis?

Better responses correctly mentioned the genetic basis of cystic fibrosis by stating its cause, i.e. lack of gene that codes for trans-membrane carrier of the chloride ion/ mutations in the gene that produces the cystic fibrosis trans-membrane conductance regulator (CFTR) protein.

In the second part of the question, better responses revealed clear understanding of the reason and the way that affect the respiratory passages of a patient. Such responses mentioned the accumulation of mucus in the respiratory passages of a patient and further it was described that the cilia cannot easily move the thick and sticky mucus out of the respiratory passages. The mucus clogs the air passages, causing chronic cough and lung infections. Repeated lung infections can lead to lung damage, causing breathing problems and difficulty getting enough oxygen into the body. **Example:**

The genetic basis of applic fibrosis is a defective gene for the anythe cystic fibrosis transmembrane regulator. The gene is present on chromosome ii. How are respiratory passages affected in a patient suffering from cystic fibrosis? (1 Mark) from cystic fibracly, thick slicky In a patient. suffering. MALOUS ACCOMPLES <u>testinge</u>tal__ <u>hn</u>

Weaker responses overlooked the main key terms given in the question such as 'genetic basis' and 'effect on the respiratory system'. These responses provided answers regardless of the relevancy to the key terms. For example, in the first part of the question, cystic fibrosis is considered as pathogenic disorder and in the second part of the question, respiratory infections were described.

Example 1:



Example 2:



Question 8:

With reference to Darwin's theory of evolution, describe the following:

- a. descent with modification
- b. natural selection

Better responses correctly described the Darwin's theory of evolution with reference to descent with modification by mentioning the unity of life and the diversity of life which shows animals are emerging from ancestors and diversify by adapting different environments.

Similarly, natural selection is described by highlighting the inheritance of strong traits/ survival of fittest / struggle for existence of animals and high rate of reproduction of the fittest animals.

a.

Example 1:

AS) All the forms of life present today can be traced back single common Ancester According to draw in theory, organism poesent in the early stages of earth save rive to all the due to the process of evolution and moditoday obganisms poesent in the is genetic _ material. fication

Example 2:

According to Darwin's theory of evolution, All the organisms form of their ancestors. They are modified with modification and have arised have adapted different mod the time spa

b.

Example 1:

Daewin falks about natural selection in this theory that natu selects the fittert organisms amongst all. It includes man offsprings pollowed by the inter and intra specific them for food & shelter. Surviving in harsh climatic undition and theough all this nature selects the characters that is fittest.

Example 2:

is a process by which appanisms are selected by Ad .#Ł to subvive in their environment. Those aganisms which nature suitable characteristics to cope with envisonmental scoplen have. fittest in their population can subvive and explace ponetic variations interbreed

Weaker responses provided incomplete answers in each case such as with reference to descent with modification, most of the candidates did not highlight the common ancestor, which is an important part of the description and thoroughly described modification.

Likewise, partial description was also given with reference to natural selection. In this case, most of the candidates mentioned high rate of reproduction.

a:

Example 1:

> Danwin concepts was the Parks -time to time by disuse of Htan . we ന mygans get adopted by the way they parts Kolin are used

Example 2:

when the coosystem that long plants , like grigste needs feed to <u>ecosy</u>ster -o Height to proch Strecher and this ob there. The neck of graff Homy parsto their generatione.

Example:

According to Darwing Natural Selection is use are Inherited and are present here because of our ancetors. We are from our Ascestor and having heritarie and background before from which we are present here is the Natural Scleation. by the creator and through Ancestore ve are !

Question 9:

- a. Name the coniferous forests that are located at:
 - i. high altitude
 - ii. high latitude
- b. How is flora of the coniferous forests adapted to the longer and colder winters?
- c. Name any TWO regions where coniferous forests are located in Pakistan.

Better responses in part ' \mathbf{a} ' of the question, correctly named the coniferous forests located at high altitude and latitude, i.e. alpine and boreal respectively.

Example:

high altitude ine, Forest conferous high latitude ii. Conferous Forest Coreal

In part '**b**', better responses correctly mentioned the mechanism of adaptation of the coniferous forests to the longer and colder winter by mentioning the formation of thick waxy needle like leaves.

Example:

In the part 'c' candidates correctly named the regions of Pakistan where coniferous forests are located such as Kaghan, Swat (Mallam Jabba), Dir, and Chilas.

b:

Example:

The mursee hills, swat, die , chilas have conferou foreste in Pakirtan .

Weaker responses wrongly named coniferous forests that are located at high altitude and latitude. Some of the candidates stated names of types of ecosystem.

Example 1:

j,	tigh altitude Tropical forests
ii.	high latinude primary forests

Example 2:

i. high altitude Temperete	foxest		
in. high latitude <u>Tempenate</u>	decidious	forest	<u>-</u>

In the second part of the question, most of the candidates described the climatic condition, fauna, flora and geographical distribution of the coniferous forest.

Example 1:

They are adapted to longer and colder winters because
they are present usually on mountancous aveas

Third part of the question reflected candidates' lack of knowledge about distribution of coniferous forests in the context of Pakistan.



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 'Endocrinology; effects of hypo-secretion of different hormones and their effects on the body as compared to the understanding of 'menstrual cycle of human female' which was asked in part 'b'. Similarly, in question 11, part 'b' was preferred over 'a'. This indicates that candidates are more confident in environmental issues rather than type of ecological interactions.

Question 10a:

- i. What is the site of formation of antidiuretic hormone (ADH)?
- ii. Describe any ONE function and any ONE disorder caused by the hypo-secretion of:
 - Somatotrophin hormone (STH)
 - Gonadotrophic hormone (GTH)
 - Antidiuretic hormone (ADH)

Better responses correctly identified the site of formation of antidiuretic hormone, i.e. hypothalamus.

In the second part, better responses revealed strong grip on the physiology of hormone and candidates articulated their answer very efficiently by correctly describing the function and disorder caused by hypo-secretion of each hormone. Such responses mentioned the function of Somatotrophin hormone, i.e. it stimulates the growth of essentially all tissues of the body, including bone, protein synthesis and increases fat breakdown to provide the energy necessary for tissue growth. It also antagonises (opposes) the action of insulin. GTH may act directly on tissues, but much of its effect is mediated by stimulation of the liver and other tissues to produce and release insulin-like growth factors. The hypo-secretion of somatotrophin hormone causes short stature and dwarfism. Furthermore, the function of gonadotrophic hormone included stimulation of the gonads, or sex glands, to carry out their reproductive or endocrine functions. The hyposcretion of gonadotrophic hormone causes infertility in females and males.

The functions of Antidiuretic hormone included the control of blood pressure by acting on the kidneys and the blood vessels; conserve the fluid volume of the body by reducing the amount of water passed out in the urine. Low levels of anti-diuretic hormone will cause the kidneys to excrete too much water. Urine volume will increase leading to dehydration and a fall in blood pressure/ diabetes insipidus.

Antidiuretic Hormone (ADH) is formed hypothalamus ú٢ in brain From there, it comes to posterior labe of pilotary gland and is stored in the pituicytes there When needed in body, Posterior Labe of pitutary gland Keleases the Antidiuretic Hormone in a Somptotrophin Hormone (STH) Function: It helps growth of the body When growth has ansat than STH promotes protein synthesis. Disorder caused by hypo-secretion: Hypo-secretion of STH during conty ages ause Dwartism and after casing of growth 2 Aphidiuretic Hormone: (ADH) Function: ADH increases acts on collecting tubules of rephron and cours increase the reaksorption of water. Hypo-Secretion: Decreased amount of ADH cause less reabsorption of water. Thus lorge amounts of dilute wine is produced. This condition is rolled Diabetes Insignidus Insipidus. During shortage of water, it can cause sovere deliperation. 3 Gonodotrophic Hormone . Function: It stimulates many other hormones and control the reproduction in both males and females. Hypo-secretion: In females, hypo-secretion of goodshophic hormone can cause menshual impularity and consequently infertility.

Weaker responses demonstrated a general trend in incorrectly identifying the site of formation of antidiuretic hormone. Such responses incorrectly named the pituitary gland.

In the second part of the question, most of the candidates somehow correctly mentioned function of given hormones. However, many of the candidates misinterpreted the meaning of hypo-secretion and described disorders caused by hyper-secretion of given hormones.

Candidates are highly recommended to emphasise on the vocabulary used in physiological concepts such as hyper-secretion/ hypo-secretion/ site of formation of any hormone/ source of storage of any hormone.

Example 1:

formation of ADH is advenal cortex site of function - production of somatic calls STH :disorder -- inhibit absorption of ii-Gonadotropic hormone:tunction: - help in absorption :- difficulty in wine iii- Antidivretic hormone:function:-difficulty in usea production. - accumulation ste products

Example 2:

i- Antidiuratic hormone jurned in Pitutary glands. ii- HYPO secreation of Somototrophin help in the burnstion of Gometric calls and it it is over secrected Scining Occur (3 HUPS seeven has of Gonadohopin hormome increase the burnetion of sperms in Men and Own in Women 1 and The disorder which is caused by it is Ards. 3 Hypo secretation of Antidioretic bosonie belp in Mure absorbtion of Water in Kidney. And the disorder which Caused by ADIT is <u>Constitution</u> (is a type of <u>dease</u> disorder where <u>Mure absorbtion of water occur as a result more</u> rough facces come out with in many minutes.



i. Which phase of uterine cycle occurs simultaneously with each event of the ovarian cycle mentioned above?

Ovarian Cycle	Uterine Cycle
Event I	
Event II	
Event III	

ii. Describe the hormonal effect of events I and III of ovarian cycle on the thickness of the endometrium.

Better responses revealed accurate understanding of the stimulus and key terms given in the question. Such responses correctly identified the phases of uterine cycle such as event I of ovarian cycle correlates with the menstrual phase of uterine cycle, event II correlates with the proliferative phase of uterine cycle and event III of correlates with the secretory phase of uterine cycle.

In the second part of the question, clear understanding of hormonal effect of ovarian cycle on the uterine cycle is exhibited. Such responses correctly used the biological terms and names of hormones while drafting their answers. The hormonal effect of event I on endometrium is the decreased level of progesterone causing shedding of uterine wall therefore, uterine thickness declines. Likewise, hormonal effect of event III on endometrium was described as, endometrium continues to grow with decreased FSH and increased level of estrogen and release of progesterone from the corpus luteum further increases thickness of endometrium.

Example:

 Which phase of uterine cycle occurs simultaneously with each event of the ovarian cycle mentioned above? (3 Marks)

Ovarian Cycle	Uterine Cycle	
Event I	Menstrual Phase	
Event II	Proliforative Phase	
Event III	Secretory phase (ovulation + corpus Leuteur Phase).	

Describe the hormonal effect of events I and III of ovarian cycle on the thickness of the endometrium. (4 Marks)

(b) Event I: The Menstrual Phase :- This phase is characterised blood which is produced tow of menstrual due to the dding of n 0 phase there is low secret In This estrogen and progesterone. The levels of Colrogen and causes the the endometrium walls. The breakdown 0 connective tissues This menstrual Howh Hood, mucous and peotrogen and pro 1-5 days. Here diminished levels of geocrone are observed. Event III Secretory Phase: This phase is further divided into two tooes i) ovulation: In this phase the levels of Lutenizing hormone which Rices ses the release the ovum. After the release of ovum plucles yellow g Structure corpusienteun. caued The The next phase the corpus lectum ase to secrete another Щ corpus Leiteum orpuse me cours regestrone coures uterus small endometrium and prepares the uteru implanta The out oteli ration occurs) and maintains It also inhibits justher maturation of follicles Howev Inthe does not occur the corpus luteum starts to deg ed the level merate a rone aves the shedding aun metrium and menstrual phase starts.

Weaker responses indicated candidates' inability to relate the ovarian cycle with the uterine cycle. From these responses, an overall trend of misunderstanding of uterine and ovarian cycle was apparent. These responses were unable to differentiate between both cycles, thus, gave generalised answers.

In the second part, candidates provided memorised description of menstrual cycle; irrespective of the given stimulus.

mentioned above?		(3 Marks)	
Overian Cycle	Uterine Cvele		
Event I	Endometrium Starts to form Endometrium formatio		
Event II	completed.		
Event IJI	Endometrium sheds off		
 Describe the hormonal et endometrium. 	fect of events I and III of ovarian c	yeld on the thickness of the (4 Marks)	
ii) In Event I, the f	ollicle stimulating horn	none and teutimizing	
bornomes de secrete	d at high levels to :	stimulate formation	
of follicles and. Progestrone level is also high for the			
formation of endometrium and its thickening.			
In Event III, the endometerium is thinning up and			
shedding due to		· · · · · · · · · · · · · · · · · · ·	
· ·		<u> </u>	

Question 11a:

Describe any TWO examples of positive ecological interaction and any TWO examples of negative ecological interaction in an ecosystem.

Better responses showed clear understanding and good knowledge of examples of positive and negative ecological interactions. Some other credit worthy responses first defined the type of ecological interaction and then described the association between organisms. There was good variety of examples different responses. Most frequently appeared examples were mutualistic association between lichen a species of algae and a species of fungus/ symbiotic association between bacteria and legumes plants/ mutualistic association between Trichonympha and termite/ association between spider crab and algae.

osical WD exam 109 DU s, 1 Ceraction in ທາງປະ De C ŝ misms መጠ ሮ የ INN ion r (ທາດ ne. e e 1mm elib.

nonsalism: Itistype of interaction in which R mailter bene (me me e 4 $i c \partial$ 0 ex000 ා්ළා 1051 than setting ٩C Miles mon 5 [<u>&</u>u لرح 3D e УC (51 Wei e t 40an m ísi ies me 30 γ びん ក្រ <u>6</u>5. രാശ Ċ7 n_{2} ∂w exam m ę one who is C m cC.uu OmИŚ $\alpha c l$ 2 Rive mananci CUDE สก u to m രം പ XOBN 2 man. q hile -allmo IVE imsic proc e

Weaker responses were able to mention the correct example but struggled to describe the interaction in the example they provided. Some of the candidates swapped the examples of positive and negative ecological interactions. Few other responses described the interaction with irrelevant examples. Many of the candidates described afforestation, deforestation and global warming. Some other weaker responses elaborated the meaning of positive and negative terms.

Ecosystem mferaction a Ecology: The study of ð٣ Including environment both biotic and ተo Ecology. factors is known as abiotic living Ecosystem æ organisms pristant Prost Se Nutrition the protection depending biotic living othe actors 0r return harm, benedit has no ell for one Food chains and decreased resulting in favourable stable fortiary ゃ consumers ir Ferlili Kacteria. Introducing technique o and using the abon Fertilizers rich in nitrifying bacteria which could soil fam the air which results jħ. into soil errosion and malee soil more will result in yudir plant crop. Interactions : gative Ecologic al øł living organisms with their ĩ'n ናећ/ በ harms pollution: Due to increax in industrialization ful, toxic gases are emitted into the atmosph combusion of results in depletion of Os, Acid Rain, diseases in human destruction of crops he release of fonic wastes in aquatic zone, 994 atic ecosyste and disturbed and disbalanced. ÌS.

Question 11b:

- i. Describe the phenomena of greenhouse effect and acid rain considering methane and sulphur dioxide as their main sources respectively.
- ii. Mention any TWO effects of global warming and any TWO effects of acid rain.

Better responses correctly stated the role of methane that act as a sheet of greenhouse in atmosphere; such as, after absorbing the sun rays it does not permit them to escape back. Thus, this action of methane results to increased temperature of earth.

Sulphur dioxide combines with water vapours in the atmosphere to form acids like sulphurous acid and sulphuric acid. After sometime, these acids fall on ground in the form of rain or microscopic particles.

In the second part of the question, better responses correctly mentioned the effects of global warming such as melting of snow or ice/ raises sea levels/ causes stronger storms/ causes extreme weather while that of acid rain as it washes nutrients from soil/ destroys both aquatic and terrestrial life/ destroys crops/ causes erosion of monuments/ skin diseases.

b) GREENHOUSE EFFECT: The carbon acts as the grass of the green house which means that caubon forms a blanket over the Earth and is engaged in The sun's heat before it is reflected back mits space. Thus, carbon and ases such as CHYL methane) are roopa taining The temperature on Earth by trapping increased levels o These cause global nount the concentration a These gases large 0 trapped and thus the temperature of Earth rises drasticall Thes rice in the general temperature of Earth. caued warming are as follows l effects of () The increased temperature would cause the rapid melting placiers which would ttimately lead to proods destruction to life on (2) When the temperature on Earth eise, it would lead to the of the me natural ecosystem and many orga natural habitat. As a result, even orga or are under the threat of extinction. The increased temperate could it is increased life impossible beyond the toler Other ratural colonies such as yelones, arou

one likely to occur more prequently due to increased tomporatime. i) ACID RAIN: When the oxides of Suphur increase ages they m and rains. The burning so possils and and other sources suppor no the en. When These onides seart with release ouides o phinous and The wal be precipated out work the ear water. This nenon is c + 112504. H2SO3 50z HLO and sain and sam is decreased and the Low than the normal The pH 01 rain. The effects of and lain are; () Acid rain may cause skin diseases such as allongies and skin cancer. (2) when and rain galls on the soil it makes it not suitable to etation. Its a result there is deucased product It may leach heavy metals like aluminium ion soi w rich would ecosystems with water tomaine Marine animals when consume diam away consumed by humans can cause it hard to survive and if saious health issues growth is stunted. rlant

Weaker responses were unable to meet the demand of the question. Most of the responses, instead of describing greenhouse effect, described the process and significance of greenhouse made up of glass or plastic for the production of vegetables. Some of the responses described causes and effects of ozone depletion.

In the second part of the question, weaker responses stated generalised points such as global warming and acid rain cause death/ make environment polluted/ affect organisms.

The phenomena of green house effect is. Green house effect is formed due to the availability (asbon The pasticles <u>alloxide gas be the</u> <u>ichich</u> present in all Con On Carbon dioxide <u>_ ⊖+ ୯</u>++ ale less amount & Oxygen and nitrogen of Phosphonus <u> SOr</u> ase dangesous and harmful for the human health causes due to over- pollution in the asso surroundings such as Ad Pollution, Water Pollution, Noise Pollution etc. through which these non-toxic substances are produced. The influences of Carbon deoxide gas I with the other substances form <u>Casen housing effect</u>. Acid sala is formed due the high concentration of sulphus droxide sur is present in an pasticles. It combines nitiogen and photter carbon monoside to form and <u> പ്രണ്ടി</u> The (CFCS) Chloroflouro Carbons are used in the <u>Lain</u> production of the Baid sain.