EXAMINERS' REPORT

AM BIOLOGY

FIRST SESSION 2018

Part 1: General Statistics

The examination consisted of four papers. Paper 1 contained 10 compulsory, structured questions. Paper 2 consisted of 3 sections, namely: section A which was a compulsory comprehension exercise; section B which contained 4 essay type questions from which candidates choose 2 and section C which consisted of 2 structured questions from which candidates select 1. Paper 3 comprised 3 compulsory structured questions based on practical work. Paper 4 was a hands-on practical examination which contained 1 compulsory question. Moderation of the original laboratory and practical reports was included in Paper 4.

Six hundred twenty-one candidates registered for the May 2018 examination and, of these, six hundred and six candidates presented themselves for examination.

The distributions of grades awarded in the May 2018 session are given in **Table 1**.

Table 1: Distribution of grades awarded in May 2018.

Grade	A	B	C	D	E	F	Absent	Total
Number	69	126	157	109	78	67	15	621
% of Total	11.1	20.3	25.3	17.6	12.6	10.8	2.4	100

Part 2: General Comment by Markers

Paper 1

Question 1 – The cell
Q1.a   Most responses correctly identified only one type of function for the integral proteins, that is, the transport function.
Q1.b   The question was generally answered well; however number of responses gave a general simplistic function of the nucleus instead.
Q1.c   A considerable amount of answers included the number of chromosomes in a human cell or the 9 + 2 microtubule arrangement for spindle formation rather than the number of centrioles. The role of the centrioles was however clearly known.
Q1.d   The majority of the replies were correct and identified lysosomes as the organelles responsible for the lysis of worn-out organelles. The common erroneous answer was the Golgi apparatus.
Q1.e   The majority of the answers were incomplete. The cisternae were commonly not mentioned; however most responses included the presence of a 'cis' and 'trans' side as regards structure. A number of replies included the function rather than a description of the Golgi apparatus. When diagrams were presented as answers, most of them were not annotated as instructed in the question.

Question 2 – Biomolecules and enzymes
Q2.a   Most answers correctly mentioned the properties of water. However, a considerable number did not include the biological significance of the said properties. The biological significance for the high specific heat capacity and high heat of vaporisation were mixed up in a number of cases.

Q2.b   The majority of the candidates answered this question correctly, with the appropriate mention of hydrolysis and condensation reactions in the breaking down and building up of proteins respectively.

Q2.c   Most of the responses were incomplete. Only a few answers mentioned the existence of an allosteric site and that the enzyme can be either inhibited or enhanced through allosteric regulation.

Q2.d   The majority of the answers included that phosphofructokinase catalyses the conversion of fructose-6-phosphate to fructose1,6-bisphosphate, however they failed to state that this is an allosterically regulated enzyme.

Question 3 – Heterotrophic nutrition

Q3.a   Very few answers showed the correct labelling. The most common mistake was confusing the mucosa with the serosa.

Q3.b   The majority of the answers correctly elucidated that nutrients are transported into the blood vessels in the mucosal epithelium of the small intestine by diffusion, however very few replies included that the concentration gradient is maintained by constantly transporting the nutrients away from the site of absorption.

Q3.c   In general, the names of the four chambers of the stomach were correctly listed. Knowledge of the function of each chamber in the ruminant digestive process was generally lacking.

Question 4 – Transmission of nervous system

Q4.a   Few answers correctly gave the advantages of the chemical synapse. The majority of the responses listed and explained the advantages of the nervous system. A few answers compared and contrasted the endocrine system and the nervous system.

Q4.b   Examples of polysynaptic reflexes were generally not known, with the 'knee-jerk reflex' given as an example for both types of reflexes.

Q4.c   Most of the candidates correctly calculated the speed on the impulse.

Q4.d.   A considerable number of responses correctly deduced that Reflex B is polysynaptic as this was slower, however very few made the link between the slower speed and the increased number of synapses across which neurotransmitter has to be released, cross the synapse and attach to receptors on post-synaptic membrane.

Q4.e   Most answers were satisfactory showing that the speed of the impulse will be slower. Many candidates correctly deduced that this was due to a lack of Nodes of Ranvier that is no saltatory conduction will be carried out. It must be noted that very few candidates included that in such a case more action potentials must be generated all along the neuron.

Question 5 - Immunology and excretory system

Q5.a   A considerable number of responses were correct.

Q5.b   The majority of the candidates answered this correctly.

Q5.c   A considerable amount of candidates answered this question with 'T cells' rather than specifying 'helper T-cells'.

Q5.d   Candidates found this question challenging and the majority of candidates answered it erroneously or incompletely. A popular correct difference was that MHC class I glycoproteins present antigens to T cytotoxic cells whereas MHC class II glycoproteins present antigens to helper T cells.

Q5.e   The majority of the candidates knew the answer to this question.

Q5.f   There were a considerable number of candidates who answered both parts of this question incorrectly.

Question 6 - Biotechnology

Q6.a   On average, responses given were correct.

Q6.b   The majority of the answers were correct.

Q6.c   The majority of responses were correct.

Q6.d   Most answers were incomplete and failed to mention that the same restriction enzymes used to cut genes are also used to cut open plasmids and that DNA ligase is used to bond backbones of both DNA samples.

Q6.e   On average, answers given were correct.

Question 7 - Meiosis

Q7.a   On average, answers were incomplete.

Q7.b   The majority of the candidates answered this question correctly.

Q7.c   The majority of the candidates knew the ways by which meiosis results in genetic diversity, however, in some cases, they confused the stage at which these take place.

Q7.d   The majority of the candidates answered this question correctly.

Q7.e   The majority of the responses were correct with the term 'reduction division' being commonly mentioned.

Question 8 – Transport in animals

Q8.a   The majority of the responses were correct and identified the two systems as being closed circulatory systems.

Q8.b   Most of the replies distinguished between a double circulatory system and a single circulatory system.

Q8.c   The majority of the candidates correctly gave examples of fish that have a single circulatory system and examples of mammals that are characterised by a double circulatory system.

Q8.d   A considerable number of answers were incomplete or incorrect.

Q8.e   The majority of the responses were correct.

Q8.f   On average, candidates fared well in this question. Marks were lost upon switching of the Bicuspid and Tricuspid valves; the pulmonary artery and pulmonary vein and failing to mention the Vena cava and the Aorta.

Question 9 – Environmental Biology

Q9.a   A considerable number of replies were incorrect with the most common error being predation rather than commensalism.

Q9.b   The majority of the responses were correct.

Q9.c   Most of the responses were correct.

Q9.d.i On average, candidates answered this question wrongly as the name of the enzyme was not known.

Q9.d.ii Few candidates answered this question correctly with the most common examples being '*Rhizobium*' and '*Azotobacter*'.

Q9.d.iii The majority of the responses showed that there is knowledge that it is leguminous plants that have a mutualistic relationship with nitrogen-fixing bacteria, however two types of leguminous plants were routinely not mentioned.

Q9.d.iv On average, this question was either answered incompletely or answered wrongly. Some candidates explained the process of nitrogen fixation instead.

Q9.e Most of the replies were incorrect.

Paper 2

Section A – (comprehension exercise)

Q1.a A number of candidates did not mention the three levels of biodiversity correctly.

Q1.b This question was routinely answered correctly.

Q1.c The majority of answers were correct.

Q1.d The majority of responses were correct.

Q1.e Many candidates successfully named and explained the type of population growth exhibited by the predatory starfish.

Q1.f A number of replies failed to describe the population growth as density independent.

Q1.g Many responses included the sketch of a sigmoidal curve, rather than a J-shaped growth curve.

Q1.h Following through the replies given to the previous questions, numerous candidates mentioned the J-shaped growth curve rather than the S-curve. A correct difference between the two types of curves was routinely included in the answer.

Q1.i This question was routinely answered correctly.

Q1.j Many candidates answered this question correctly, by mentioning that carbon dioxide in the air is increasing as a result of the increase in burning of fossil fuels. As a consequence, water becomes more acidic and global temperatures increase.

Section B - (essay questions, to choose two)

Question 1 – Protein synthesis (Response rate: 61.5%)

A good number of essays were of average standard; however details, for example, direction of transcription and translation were lacking. The terms promoter and primer were often used interchangeably and transcription was often mistaken for translation and vice versa. A number of responses showed a misconception about codons and identified codons as being a part of rRNA. Some essays were completely out of point since they were a mere account of DNA replication and no reference whatsoever was made to protein synthesis. Some also gave a detailed account of the properties of the genetic code followed by a scanty account of the actual protein synthesis process. Diagrams showing transcription and translation were sometimes missing.

Question 2 – Gaseous Exchange (Response rate: 73.0%)

This essay was very popular amongst candidates. A number of essays ignored Fick's Law completely and lacked a definition of the law and the equation derived from it. Essays were often an account of the different gaseous exchange mechanisms in the insects, fish and mammals and no reference to Fick's law was made. Moreover, a large number of accounts were not comparative. A recurring misconception was that insects use their circulatory system to transport respiratory gases. Ventilation was also often not tackled in the essays.

Question 3 – Homeostasis (Response rate: 40.9%)

Many essays gave a good definition of homeostasis and the need of feedback mechanisms in maintaining a steady state. Very few described and defined the various components in a control system. In spite of giving correct examples of both positive and negative feedbacks, some responses failed to explain clearly how the mentioned examples show positive and negative feedback.

Question 4 – Fertilisation in angiosperms (Response rate: 23.6%)

The majority of essays showed a detailed explanation of alternation of generations and gametogenesis in flowering plants but focused very little on the actual process of fertilisation. Quite a good number of responses included out of point detail on pollination and highlighted differences between entomophilous and anemophilous pollination at the expense of little or no mention of the actual fertilisation process. When present, the account on fertilisation was often not detailed enough and lacked diagrams to illustrate better points described in the essay.

Section C - (structured essay questions, to choose one)

Question 1 (Response rate: 63.8%)

Q1.a The majority of candidates could distinguish between diploblastic and triploblastic organisms.

Q1.b Many replies provided adequate detail to describe differences between oogenesis and spermatogenesis.

Q1.c Many answers lacked detail.

Q1.d Overall, this part was answered satisfactorily.

Q1.e Many candidates did not provide enough points to distinguish between the sino-atrial node and atrioventricular node.

Question 2 (Response rate: 36.2%)

Q2.a Numerous candidates answered this part satisfactorily. Some failed to mention explicitly that what was observed is known as the 'bottleneck effect'.

Q2.b This part was generally satisfactorily answered. However, marks were lost in cases in which not enough adaptations were mentioned.

Q2.c This part was routinely answered correctly. However, some responses failed to mention the term 'disruptive selection'.

Q2.d Marks were generally lost due to lack of detail. However, this part was generally answered well.

Q2.e A number of replies indicated that the example of a pre-zygotic geographical isolating mechanism mentioned in the question was not identified.

Paper 3

Question 1 – Enzymes

Q1.a   Most candidates answered this question successfully.

Q1.b   Most candidates answered this question successfully.

Q1.c   Even though most candidates answered this question successfully, full marks were only awarded if the effect on reaction with sand (i.e. no change) was included in the answer. A number of responses indicated the assumption that the addition of 3 drops of acetic acid, would only reduce the pH slightly from neutral, nearing the optimal pH of catalase (pH 6.8). Consequently, they replied that the rate of reaction would increase for both liver and potato since the enzyme would be working at its optimum.

Q1.d   Most candidates answered this question successfully.

Q1.e   A significant number of candidates answered this question satisfactorily.

Q1.f   Most candidates answered this question satisfactorily.

Q1.g   Most candidates answered this question successfully.

Question 2 – Classification
Q2.a   Most candidates answered all parts of this question successfully.

Q2.b   Most candidates answered both parts of this question successfully.

Q2.c   Most candidates answered this question satisfactorily.

Q2.d   Most answers were incomplete.

Question 3 – Plant Structure and Support Tissue
Q3.a   Most candidates answered this question successfully.

Q3.b   Most candidates answered this question satisfactorily.

Q3.c.i A significant number of candidates answered this question successfully.

Q3.c.ii A significant number of candidates answered this question satisfactorily. A common mistake was the confusion of the bordered pits with nuclei.

Q3.c.iii Most candidates answered this question successfully.

Q3.d   Some drawings showed incorrect proportionality and lack of neatness. Lack of detail was presented in most drawings. However, as a general note, most candidates managed to identify and label the five main ground and vascular tissues correctly.

Paper 4

In this practical, the candidates had to devise and implement an experimental procedure to find levels of glucose in three different solutions.

Q1.a   The majority of responses showed knowledge of the meaning of the term 'aim' and was applied to the given investigation correctly.

Q1.b   Most candidates identified the correct method. However, there were cases where the suggested volumes to be used were ignored. Sulfuric acid was not used in a number of cases, indicating lack of understanding of the term "reducing sugar". The type of results taken was left out in some responses.

Q1.c   Few answers missed the justification part, stating only the precaution.

Q1.d   The majority of the candidates performed well in this part since plotting of the table of results was straightforward.

Q1.e   Most candidates were able to plot the graph correctly, fulfilling all criteria. The rate 1/t and log were also accepted.

Q1.f   The interpretation of the calibration graph was generally incomplete and missing out on important points such as examples of the actual concentrations and times recorded.

Q1.g   Many replies did not take the term calibration into consideration and only approximate values were provided.

Q1.h   Provided the reasoning and value were correct, all marks were given, irrelevant of the values deduced in part (g).

Q1.i   Once again, the majority of answers lacked important detail; such as referring to fatigue and depletion of glycogen in muscles and liver.

Q1.j   Several responses listed errors which are completely irrelevant to the context, such as rinsing of apparatus and wrong readings due to reaction time (this is equivalent to all readings taken since they are taken by the same individual)

Q1.k   Most candidates mentioned the use of a colorimeter and titration which is correct. Taking repeated readings and establishing a control are part of every experiment and not a modification.

Part 3:   Moderation of practical work.

In the majority of the cases, the laboratory reports were of high standard and covered all sections of the syllabus.

Part 4:   General conclusion.

On a general note, whenever the questions entailed recall of Biological facts, the performance of the candidates was satisfactory. Generally, the answers given indicated difficulty when it comes to higher order skills, where candidates encounter difficulty when applying learnt Biological knowledge to new situations. Furthermore, it was noted that some responses, especially the essay-type, were not properly planned – in many cases, although detailed answers were given, the specificity of the question was overlooked. This resulted in having considerable parts of the answer being irrelevant and out of point.

Chairperson

2018 Examination Panel