1.0 General Remarks

2.0 Statistical Information

Table 1 below shows the distribution of grades for the May 2010 Session.

<table>
<thead>
<tr>
<th>GRADE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Abs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>84</td>
<td>170</td>
<td>153</td>
<td>111</td>
<td>84</td>
<td>64</td>
<td>26</td>
<td>692</td>
</tr>
<tr>
<td>% of Total</td>
<td>12.14</td>
<td>24.57</td>
<td>22.11</td>
<td>16.04</td>
<td>12.14</td>
<td>9.25</td>
<td>3.76</td>
<td>100</td>
</tr>
</tbody>
</table>

3.0 Comments regarding candidates’ performance

**Question 1: Bryophyta and Tracheophyta**
Questions 1.1 and 1.2 were answered correctly by most candidates, although some candidates confused the terms ‘gametophytes’ and ‘sporophyte’. Most candidates knew the correct answer to question 1.3, although a common mistake was for the term “trachea/tracheoles” to be used instead of “tracheid”, or not to give enough detail. Question 1.4 was answered correctly by most candidates, although some confused the terms ‘gametophytes’ and ‘sporophyte’. Many candidates struggled with question 1.5, giving a variety of incorrect answers; similarly for question 1.8. Candidates were mostly able to distinguish between the terms ‘homosporous’ and ‘heterosporous’ in question 1.6, although detail was sometimes lacking. Question 1.7 presented some difficulty to candidates, and many candidates appeared unaware of the specific difficulties bryophytes face in terms of lack of adaptation to an environment where water is lacking.

**Question 2: Ecological Succession**
In this question candidates generally gave correct definitions however they struggled to give adequate or complete examples particularly for primary and secondary succession and climax communities. A number of candidates confused the concept of succession with trophic levels stating that pioneers are autotrophs and climax communities being the carnivores, for example. As a result this question was one in which candidates fared least well.

**Question 3: Transport across membranes**
Candidates fared best in this question out of the entire paper. Generally Question 3.1 and 3.2 were answered correctly however in some cases, the terms ‘active transport’ and ‘passive transport’ were exchanged. In the case of question 3.3, candidates often exchanged the definition of primary and secondary active transport or else failed to identify the role of ATP, which was central to the answer. In general examples of secondary active transport were correct, less so for primary active transport. A number of candidates gave an incorrect interpretation stating that aquaporins are permeable to ions but not water (for example by having two separate pores) or else failed to pinpoint the proper answer stating for example that aquaporins are proteins and therefore they are denatured by heavy metals.

**Question 4: Natural Selection**
Candidates struggled with this question, especially the evolutionary definition of adaptation (commonly given as becoming accustomed to a new environment), and the naming of different types of isolating mechanisms (particularly 4.3 (b) and (c)). A large number of candidates confused isolating mechanisms with speciation mechanisms (e.g. allopatric speciation) or selection pressures (e.g. directional selection) and did not appear to be thoroughly familiar with pre-and post-zygotic mechanisms. In question 4.2, most candidates lost marks for not mentioning fitness/reproduction in connection with camouflage and predation.

**Question 5: Environmental Biology**
Questions 5.1 and 5.3 were mostly answered correctly by the candidates, although some candidates postulated that CFCs react with DNA, causing mutations, whereas others failed to mention the role of acid rain in question 5.3. Candidates found most difficulty with question 5.2, which presented candidates with an unfamiliar scenario; however a substantial proportion of the candidates still managed to answer the question at least partially correctly.
Question 6: Nervous transmission
Candidates obtained an average of 60% of the available score in this question. Marks were lost mainly in question 6.3 regarding the effects of nicotine. Marks were also lost when candidates failed to give a full answer to question 6.1 or interchanged some of the steps involved in the process for example exchanging release of release of Ca^{2+} and Na^{+}.

Question 7: PCR
A good number of candidates gave a wrong definition of PCR, which was surprising. Marks were also lost in questions 7.3 and 7.4 where candidates respectively gave, for example, 32 pairs as an answer and specific applications in which PCR is not necessary. The basic principle of PCR for should be better appreciated by candidates thus preventing loss of marks in such a question.

Question 8: Excretion
In question 8.1, candidates often lost marks due to not giving any detail regarding uses of glucose in the body (stating simply that “it is needed by the body”), while in question 8.2, many candidates focused more on the mechanics of re-absorption of water and sodium (“how”), rather than the reason (“why”). Most candidates answered question 8.3 correctly, although the exact term was commonly misspelt. In question 8.4, many candidates failed to mention that nitrogenous wastes contain nitrogen whilst some also gave the nitrogen cycle as the biochemical process that produces nitrogenous waste. In question 8.5, a common mistake was for candidates to give birds or insects in their answer to ammonia or urea-producing organisms.

Question 9: Heredity
Most candidates obtained full marks for this question, however it was evident that some candidates did not understand the question and gave 15:1 or 9:3:3:1 as phenotypic ratios, despite having worked out the correct Punnet square.

Question 10: Photosynthesis
Many candidates fared badly in this question and generally lost marks in all sub-questions. In question 10.1 wrong descriptions, wrong reasons for changes or no reasons at all were given. In question 10.4, photorespiration was often confused with the compensation point for respiration and photosynthesis. Otherwise some candidates referred to photorespiration as the process in which respiration occurs with the use of light

Paper 2
Section A
Question 1: comprehension exercise
Q1.1 A high proportion of candidates accurately described the role of insulin in the human body.
Q1.2 Many candidates correctly identified the beta-cells of the islets of Langerhans as the site of insulin production. More generic answers, like the pancreatic cells, were not awarded full marks.
Q1.3 Very few candidates scored any marks in this question. Some elaborate and biologically absurd answers were given, when in fact, candidates simply needed to logically identify that there would be insufficient donors available.
Q1.4 Several candidates correctly realised that the immune system would otherwise elicit an immune response against the cells. Some unnecessarily elaborate answers were given by a number of candidates.
Q1.5 Few candidates answered this question correctly.
Q1.6 Some very good answers were given in response to this question. Candidates who were not awarded full marks omitted some detail in their responses.
Q1.7 Several candidates were capable of stating that a retrovirus is an RNA virus that is capable of replicating through reverse transcriptase.
Q1.8 This question, involving the use of common-sense rather than factual biological knowledge was challenging to the candidates. Few candidates gave correct responses.

Question 2: Analysis of data

Q2.1 Several candidates correctly identified the symbiotic relationship.

Q2.2 Again, it was pleasing to see a great number of correct responses to this question. Most candidates clearly explained that higher concentrations of zinc led to shorter hyphal lengths.

Q2.3 Only the more capable candidates gave correct responses to this question.

Q2.4 Quite a few candidates gave elaborate and numerically detailed answers and missed the underlying trend that shoot and root weight in Eucalyptus increased in the presence of G. deserticola, while the other two fungi had no noticeable effect.

Q2.5 Stronger candidates gave good answers but several confused answers were seen too.

Q2.6 Again, several confused answers were seen in response to this question.

Q2.7 Commensalism was given as the answer to this question by most candidates.

Q2.8 Most candidates gave a correct answer to this question.

Q2.9 A significant number of candidates could explain the importance of measuring the dry weight.

Q2.10 Surprisingly, very few candidates were capable of giving a plausible answer to this question.

Section B

Question 3: Gene technology
This question was not very popular with candidates and it was possibly the most challenging long-essay. Answers were wide-ranging, from the excellent to the fantastic. Biologically sound answers should have included the use of gene technology in agriculture and in dairy farms.

Question 4: Cell function
A number of adequately good answers were given in response to this essay. The main shortcomings were poor diagrams and little reference to cells other than animal cells.

Question 5: Genetic diversity
The problem in this essay was that several candidates gave long, and detailed illustrated accounts of the different types of mutations or/and meiosis while making little reference to the key command words compare and contrast.

Question 6: Asexual reproduction
There were many good comprehensive answers in response to this essay question. Several candidates were capable of accurately identifying the advantages and disadvantages related to asexual reproduction.

Section C

Question 7: General
This question posed no major challenges and mainly required recall of facts. Some excellent results were seen in response to this question. It was pleasing to see that most candidates’ knowledge of biochemistry is sound.
Question 8: General
Again, it was pleasing to see that the vast majority of candidates has a good understanding of the selective advantages posed in the questions. Remarkably, the least well-answered part of the question was that which required a knowledge of plant physiology and salt glands.

Paper 3

Question 1: Plant structure
Most candidates gained marks from this question. On the same note, full marks, though present were rare since annotations/labels were rarely fully correct.

Q1.1: A substantial number of candidates gave the correct answer, however a number of candidates identified the structure as a root or as a leaf. The structure may have been identified as a root since the trichomes at the periphery were mistaken for roots hairs.

Q1.2: The majority of candidates gave the correct answer however a few identified the plant as a monocot. The reasons were in essence all correct although some quoted reasons not visible in the diagram such as the presence of one or two cotyledons.

Q1.3: In general all candidates knew how to draw a low power plan, although a handful drew individual cells. However, the labelling was rarely complete.

Q1.4: Similarly to Q 1.2) the majority of candidates gave the correct answer however a few identified the plant as a dicot. The reasons were in essence all correct although some quoted reasons, such as the presence of one or two cotyledons, were not visible in the diagram

Q1.5: The most common mistake was the exchange of the xylem/ phloem annotations. These are very clearly distinguishable through the cell wall thickness. Some candidates labelled the epidermis as the cuticle, upper epidermis or epithelium.

Q1.6: This question was often answered correctly, however some candidates gave terms such as cell wall, cell membrane, chloroplast, xylem, phloem, chlorenchyma, etc. all of which are clearly not visible. A few candidates also labelled cuboidal epithelium.

Q1.7: This question was often correctly answered, although in some cases the reason why a structure is important for aquatic life was not submitted.

Question 2: Normal and cristate inflorescences of Anthemis urvilleana
Q2.1: Most candidates answered question 2.1 correctly, however, some gave the opposite answer (i.e. that the null hypothesis was that there is a significant difference between populations) and some indicated that the null hypothesis was that there are no differences between normal and cristate forms of the plant. Others lost part of the mark for referring to “abundance” instead of “relative abundance”.

Q2.2: In question 2.2, a substantial proportion of candidates failed to garner full marks for this question, giving answers ranging from “transects are not accurate” to “quadrats are able to sample a larger area”.

Q2.3: Most candidates obtained full marks for question 2.3, however, a number of candidates scored no marks in this question for stating that random sampling could occur by throwing the quadrat over one’s shoulder. Others lost marks for stating that a random technique (such as random number generation) would be used, but that the coordinates generated would then be used as points from which to throw quadrats.

Q2.4: Most candidates answered question 2.4 correctly.

Q2.5: Most candidates answered question 2.5 correctly. Qalet Marku and Ghallis were the most common wrong answers.

Q2.6 and Q2.7: Very few candidates identified the paired t-test as the correct technique in question 2.6; “t-test” was the most common answer. A number of candidates gave incorrect answers for both this and question 2.7 (reversing the correct answers), while other candidates gave the Simpson’s index as their answer to one of these two questions.
Q2.8: Most candidates managed to obtain full marks for question 2.8, although some lost marks for giving vague answers, such as “the test should be repeated using a different technique”, or for giving improvements which deviated from the aim of this experiment and which would not have improved repeatability, e.g. finding the cause of this variation.

Question 3: Plant pigments
Q3.1: In question 3.1, the quality of candidates’ answers varied from very detailed and accurate descriptions to completely incorrect answers. A lot of candidates failed to garner full marks, in view of the lack of certain essential details in their description. Some candidates also completely failed to mention how the pigments were extracted. A common mistake was also for candidates to state that the chromatography paper was dipped directly in the solution containing pigments, rather than pigments being spotted onto the chromatography paper.

Q3.2: In Q 3.2 although the majority of candidates gave correct answers, some referred to wavelength, colour, density in leaves as having a role in separation of the pigments.

Q3.3: Generally answered correctly except for cases where candidates had given incorrect answers to Q3.2.

Q3.4: This question was generally answered correctly.

Paper 4
Q1.1: Generally answered satisfactorily, but the following two inaccuracies were often given:
   a) Concentrations were quoted as going up to 100%. Since the given solution was labelled as 1%, it would have been more accurate to give values of e.g. 0.25% (not 25%), 0.5% (not 50%), etc., with a maximum value of 1%.
   b) Dilutions were often described as “serial dilutions”, even when they were prepared separately from different proportions of stock solution and distilled water. The concept that serial dilutions are actually those in which each dilution is prepared from the preceding one seems not to be clear with many candidates.

Q1.2: Generally answered satisfactorily.

Q1.3: Tables were reasonably well-organised and results clear.

Q1.4: Very often, the answer to Q1.7 was given here, i.e. a theoretical explanation of the expected results, rather than a description of the results obtained.

Q1.5: Precautions were sometimes listed that the candidates could not actually take during their experiment. It is preferable to list precautions that they could really have taken.

Q1.6: Generally answered satisfactorily.

Q1.7: Some candidates were confused in this question because they had already given the answer required here in their answer to Q1.4 instead.

Chairperson
Board of Examiners
July 2010