L-Università ta' Malta

MATSEC
Examinations Board

Examiners' Report

IM Biology

Special September Session 2020

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A. STATISTICAL INFORMATION

The total number of candidates who registered to sit for Biology was 430, which is 149 candidates more than in 2019.

Table 1 shows the distribution of grades for the Main 2020 session of the examination

GRADE	A	B	C	D	E	F	ABS	TOTAL
TOTAL	7	38	61	58	81	103	83	431
% OF TOTAL	1.6	8.8	14.2	13.5	18.8	23.9	19.3	100

Table 1: Distribution of grades for IM Biology, Special September Session 2020

B. GENERAL REMARKS

General Remarks on the Written Examination

The overall performance in Section A was very poor. Approximately 50% of candidates achieved half the marks allotted for Section A. The same performance was noted in Section B.

It was noted that the achievement of extremely low marks of some candidates is the result that some candidates sit for the exam prior to following the whole syllabus since questions related to particular topics were skipped

It was notes that the performance of several candidates in spelling of biological terms was very poor.

C. COMMENTS ON PAPER

Section A

Note: Average Marks obtained per question, are shown below.

Question 1

Average Mark: 4.2/8

a) Responses in this question were generally correct.
b) Responses in this question were generally correct.
c) Responses in this question were generally correct. Several responses did not refer to ejaculation in the vagina when defining copulation. Very often, responses did not refer to fusion of nuclei of gametes during fertilization. Also, statements only referred to sperm 'meeting' egg. Several responses repeated the term that had to be defined by stating that sperm 'fertilizes' the egg.

Question 2

Average Mark: 2.8/8

a) i. Responses were often correct or partially correct.
   ii. Most responses were correct. Incorrect responses often referred to evolution or natural selection.
   iii. Responses were generally correct but often incomplete.
b) Several responses were incorrect, as they focused on predator-prey relationships from the ecological point of view.

Question 3

Average Mark: 4.3/10

a) The optimum pH was correctly identified in the vast majority of responses.
Yet, the reason for this was often not identified correctly, as responses did not relate to the graph in the question. Some responses just stated that 'enzymes work best at pH 7 or a neutral pH'.

b) Responses were often incorrect as they just stated that 'the pH was too acidic for the enzymes to work'. When denaturation was mentioned, reference to the disruption of ionic bonds within the enzyme was practically never mentioned. Also most responses referred to inactivation of the enzyme, possibly indicating that the graph was being interpreted (or rather misinterpreted) in the same way as the graph showing temperature as the independent variable.

c) Responses were often correct as denaturation was mentioned. Yet reference to the disruption of ionic bonds was practically never mentioned.

d) Responses correctly mentioned a factor that affects the rate of an enzyme catalysed reaction, with majority of them referring to temperature. Yet descriptions of the effect of the mentioned factor on the rate of an enzyme catalysed reaction were rarely given. Instead detailed explanations were given. Responses often lacked the use of correct terminology e.g. 'enzyme works best at optimum temperature' rather than 'enzyme works fastest / has the fastest rate' at optimum temperature.

Question 4

Average Mark: 1.8/10

a) Majority of responses were incorrect showing lack of mastery of the concept of recombinant DNA technology. Responses very rarely stated that DNA molecules from two organisms from different species are joined together.

b) Responses for question 4b rarely referred to the production of human insulin. When insulin was mentioned, the terms 'gene coding for insulin' and 'insulin' were used interchangeably.
   i. Several responses were partially correct, referring to the enzymes cutting part of the DNA.
   ii. Responses were often partially correct stating that the ligase joins different parts of DNA or the gene to the vector, but did not specify how. The phrase 'ligase acts as a glue' was often met, incorrectly suggesting that candidates think that the enzyme itself holds the DNA pieces together. A significant number of responses indicated confusion between ligase and lipase.
   iii. Most responses were incorrect, often repeating the term that the stick ends 'allow DNA pieces to stick together'. Other responses were partially correct as they rarely referred to the position of the sticky ends in the cleaved gene or plasmid. Reference to complimentary base pairing was often lacking as well.
   iv. Most responses correctly stated that the plasmid is used as a vector. Some responses indicated confusion between 'plasmid' and 'plasma'.

Question 5

Average Mark: 4.1/10

a) i. Majority of responses were partially correct as they stated that antibodies attach to antigens. However, they did not state that they mark the pathogen for destruction.
ii. Majority of responses were correct or partially correct. The partially correct responses often did not refer to pathogens being digested after being engulfed by phagocytes.
iii. Vast majority of responses were correct.

b) i. Antibiotics were rarely identified as chemicals that kill bacteria. However, majority of responses stated that they are not effective on viruses. Incorrect responses confused antibiotics and antibodies

c) ii. Majority of responses were correct in stating that persons who suffer from AIDS have a weaker immune system and thus are more vulnerable to other diseases. However, they were often incomplete because reference to HIV virus or destruction of helper T-lymphocytes was often omitted

Question 6

Average Mark: 1/6

Performance in this question was very poor, with only a handful of candidates gaining more than half of the marks allotted.

a) The majority of responses were incorrect.
b) Absolute majority of responses were incorrect. Often the responses were unintelligible or just confusing. Reference to neurotransmitter moving out of calcium channels was frequent.

Section B

Questions 8 and 9 were the most choosen questions, with question 10 being the least popular.

Question 7

Average Mark: 13.4/25

The majority of candidates attempted this question.

a) Several responses were partially attempted with candidates stating that a polysaccharide is a chain of monosaccharides or that it is produced by several condensation reactions.
b) This question was answered correctly.
c) The vast majority correctly listed glucose as the monomer that makes up cellulose. There were several correct drawings of the structure of glucose.
d) Some candidates confused monosaccharides with disaccharides or polysaccharides. Several functions given were incorrect as candidates stated the components of the sugar or where it is found.
e) This was mainly correct with several candidates being awarded full marks.
f) Several candidates answered correctly to this question. However, through the responses, it was evident that some candidates have misconceptions on bioaccumulation. While several candidates

gave bioaccumulation as one response, the explanation to this term was incorrect. Several candidates suggested that it is the plastic that is bioaccumulated rather that the toxins leaching out of the plastic.

Question 8

Average Mark: 8.7/25

a) Several responses to this question were partially correct. Few candidates discussed the importance of feedback loops in homeostasis. Through the responses, it was evident that some candidates have the misconception that homeostasis is the regulation of temperature only.
b) Several responses were incomplete. Few candidates included the role of gluconeogenesis in their responses.
c) Responses in this question were mainly incorrect. The reasoning that exercising in hot weather results in ultimately less oxygen to skeletal muscles was only mentioned a couple of times by candidates who attempted this question.
d) Several responses were incomplete. Some candidates used layman's terms such as goose bumps. Only few candidates explained the role of the endocrine system in increasing the metabolic rate.

Question 9

Average Mark: 11.1/25

a) i. The majority of candidates who attempted this question did not compare the different types of competition occurring in a population and community.
   ii. Only a minority of candidates discussed the flow of energy in a food chain or food web.
b) A common error by candidates was labelling the y-axis as population growth instead of population size. Some candidates erroneously confused the lag phase with the log (exponential) phase.
c) Very few candidates described the log phase as the stage when the rate of growth doubles for each time.
d) i. Several responses were incomplete.
   ii. Responses to this question were mainly correct.

Question 10

Average Mark: 13.7/25

a) Responses to this question were mainly correct. Few candidates drew a nucleotide rather than a DNA molecule. The majority of candidates did not name the sugar but listed it as pentose sugar.
b) Responses to this question were mainly correct.
c) Responses to this question were mainly correct but some responses were incomplete.
d) Responses to this question were mainly correct with four valid differences stated.

Question 11

Average Mark: 7.7/25

a) Few candidates included similarities/ differences regarding the surface area and the presence/absence of enzymes and pigments. One common misconception was that mitochondria are found only in animal cells or in animal and plant cells only. Candidates should be aware that mitochondria are found in all eukaryotic cells.
b) In majority of the responses, candidates included the link reaction as part of the Kerbs' cycle. Many candidates listed the products and the number of molecules produced. In some cases, these numbers were incorrect.
c) i. Very few candidates explained the role of the stack of thylakoids in providing a high surface area to volume ratio to increase the efficiency of photosynthesis.
   ii. Some candidates did not distinguish between the substrates and product. No candidate listed G3P (Glyceraldehyde-3-Phosphate) as a product but the majority of candidates listed glucose. This answer was also accepted. The chemical RuBP important for carbon fixation was not given as a substrate of the light dependent reaction.

D. CONCLUDING COMMENTS

The examiners noted that candidates need more training in answering structured essays. Many candidates' attempt to express themselves coherently in good English and to express themselves in a consistent and logical manner was insufficient. Some candidates were too brief in their responses especially for section B. Students performed very poorly in section A.

Chairperson
Examination Panel 2020