MAJLIS PEPERIKSAAN MALAYSIA

SASBADI

Laporan Peperiksaan STPM 2018

Biology (964)

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Biology (964)

SASBADI SDN. BHD. (139288-X)
(Anak syarikat milik penuh Sasbadi Holdings Berhad (1022660-T))
PETALING JAYA

MAJLIS PEPERIKSAAN MALAYSIA

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BIOLOGY (964/1)

OVERALL PERFORMANCE

For Semester 1 2018, 2 339 candidates sat examination for this subject and 67.98% of them obtained a full pass.

The percentage of the candidates for each grade is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	3.12	4.28	6.50	10.73	12.78	15.35	15.22	3.21	3.33	7.01	18.47

CANDIDATES' RESPONSES

SECTION A: *Multiple-Choice*

Answer Keys

Question number	Key	Question number	Key	Question number	Key
1	**A**	6	**C**	11	**D**
2	**A**	7	**D**	12	**A**
3	**B**	8	**–**	13	**B**
4	**C**	9	**A**	14	**C**
5	**A**	10	**B**	15	**D**

General comments

In general, Questions 1, 2, 3, 4, 5 and 15 were in the range of easy questions. More than 60% of the candidates managed to answer them correctly. Meanwhile, Questions 6, 7, 9, 10, 11, 13 and 14 were in the range of moderate questions where 30% to 60% of the questions could be answered by the candidates correctly. The easiest question was Question 1, in which 73% of the candidates answered the question correctly. The most difficult question was Question 12, which was answered correctly by only 30% of the candidates.

SECTION B AND C: *Structure and Essay*

General comments

In general, the questions covered all aspects of the syllabus, which include factual recall, understanding the biological concept and application of knowledge. The questions covered widely the syllabus of STPM from topic 1 to topic 6. The depths of the questions were in accordance with the syllabus.

The questions were fairly moderate with a mix of easy and some challenging questions. The questions were able to differentiate between the low potential and high potential candidates.

Comments on the individual questions

Question 16

The question was about the enzyme immobilisation. In part (*a*), the candidates were able to answer the first part of the definition correctly that is, *trapping/attaching/confining/restricting enzyme molecules*. However, some candidates wrote *attracting* or *sticking*, which were not accepted. The second part of the definition was *to a fixed solid structure/matrix/support*. Many candidates wrote *fixed medium*, which was not accepted as the answer.

In part (*b*), only few candidates answered it correctly. There were candidates who lost their marks because of a spelling error for example, *absorption* instead of *adsorption*. Many candidates gave their answers as *covalent*, which was a wrong answer.

In part (*c*), majority of the candidates wrote *covalent bond*, which was a wrong answer. There were some candidates that answered *different charge attraction* or *hydrophobic interaction*, which were not accepted as the answer too. The accepted answer for this question was *ionic bond*.

In part (*d*), only a few candidates were able to explain how the enzyme immobilisation could make the enzyme more stable. Some candidates explained the effect of heat to the structure of free enzyme. The acceptable answer was *through enzyme immobilisation, it would form multi point attachment with its support, thus, restricted its ability to change shape/3D conformation* (to change configuration was not the acceptable answer). *Therefore, it provides a stable active site*. Many candidates mentioned *stable enzyme* instead of *stable active site*.

Question 17

The question was about the aerobic respiration. In part (*a*)(i), majority of the candidates answered *P* as *glycolysis* and *R* as *electron transport chain*. However, there were candidates who answered *R* as *Krebs cycle*, which was not accepted.

In part (*a*)(ii), most of the candidates answered the number of ATP produced at *P* was 2 (which is the net production) instead of 4. Many candidates were able to give the correct number of ATP produced at *R* as 28/32/34.

In part (*b*), most of the candidates answered correctly for the numbers of NADH and $FADH_2$ produced at *P* and *Q*.

In part (*c*), majority of the candidates were able to answer the inner membrane of mitochondrion, which was the correct answer. Only a few candidates answered *inter membrane of mitochondrion* or *matrix of mitochondrion*.

In part (*d*), most candidates were able to answer that *the electron is accepted by oxygen and produced water*, which was accepted as the answer.

Question 18

In part (*a*), the question was about the structure of haemoglobin molecules. Only a few candidates were able to explain the structure of haemoglobin as *globular protein with quaternary structure, consists of 4 polypeptide chains, each chain joins to a haem group that binds with oxygen*. Most candidates only mentioned the function of haemoglobin as *transport oxygen to cells/tissues* but forgot to mention about carbon dioxide.

In part (*b*), most of the candidates described the secretion of amylase into the digestive tract for digestion. The process starts with the protein (amylase) made by ribosomes which then transferred and modified in RER. It is then transported to Golgi apparatus for further modification and eventually to the surface of pancreatic cell in secretory vesicles. Some candidates could not mention the sequence correctly, as well as they did not state the substance (protein or amylase) and vesicle (transport or secretory vesicle) correctly. Many candidates did not describe how amylase is secreted from a cell. For instance, the candidates should have answered it as *the secretory vesicle fused with the membrane of pancreatic cell and amylase is released by exocytosis*.

Question 19

In part (*a*), the question was about the roles of lipid components to the plasma membrane. Most of the candidates lost their marks because they explained the structure of plasma membrane which were not asked by the question. A few candidates described correctly the lateral movement of phospholipid molecules that give the membrane fluidity. Many candidates did not state that the double bond of unsaturated fatty acid caused the kink to prevent the close packing of phospholipid. The candidates were also not able to use the correct terms to describe the effect of moderate temperature and low temperature to the phospholipids. Most of the candidates used *high temperature*, *hot temperature*, *increase temperature*, *cold temperature* and *decrease temperature*, which were not accepted.

In part (*b*), the question was about the classes of membrane proteins. Majority of the candidates were unable to describe the classes of membrane protein such as structural protein, transport/carrier protein, globular/enzymatic protein, receptor protein and marker protein. The candidates lost their marks due to their description for each protein does not correspond correctly to its classes.

Question 20

In part (*a*), the question was about the differences between C_3 and C_4 plants leaf anatomy. Many candidates gave the comparison between C_3 and C_4 plants instead of describing both plants leaf anatomy. The candidates were supposed to differentiate in terms of Krantz anatomy, the present of spongy mesophyll, the present of chloroplast and the arrangement of mesophyll.

In part (*b*), the question was about cyclic photophosphorylation. Most candidates were able to name and explain the cyclic photophosphorylation. Few candidates wrongly named the process as *cyclic phosphosynthesis* or *cyclic phosphorylation*. There were a few candidates that described both cyclic and non-cyclic photophosphorylation correctly but they did not indicate which process was the answer to the question.

In part (*c*), the question was about the limiting factors for photosynthesis. Majority of the candidates were able to answer it correctly as the answers were *temperature*, *light intensity* and *carbon dioxide concentration*.

BIOLOGY (964/2)

OVERALL PERFORMANCE

For Semester 2 2018, 2 331 candidates sat the examination for this subject and 50.28% of them obtained a full pass.

The percentage of the candidates for each grade is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	5.28	6.78	6.35	10.21	6.48	8.32	6.86	9.91	7.38	6.61	25.83

CANDIDATES' RESPONSES

SECTION A: *Multiple-Choice*

Answer Keys

Question number	Key	Question number	Key	Question number	Key
1	**C**	6	**B**	11	**A**
2	**A**	7	**A**	12	**C**
3	**B**	8	**C**	13	**B**
4	**D**	9	**C**	14	**D**
5	**A**	10	**D**	15	**B**

General comments

In general, Questions 3 and 5 were in the range of easy questions. More than 60% of the candidates managed to answer them correctly. Meanwhile, Questionss 1, 4, 6, 8, 9, 10, 11, 12, 13 and 15 were in the range of moderate questions with 40% to 60% of the questions could be answered by the candidates correctly. The easiest question was Question 5, in which 80% of the candidates were able to answer the question correctly. The most difficult question was Question 2, which was answered correctly by only 35% of the candidates.

SECTION B AND C: *Structure and Essay*

General comments

In general, the quality of the questions was within the scope of Biology STPM Semester 2 syllabus. The types of questions were varying which include factual recall, understanding the biological concept, application of knowledge, analysing and synthesising skills. The questions were able to discriminate between the low potential and high potential candidates.

Comments on the individual questions

Question 16

The question was about growth curves and patterns of growth. In part (*a*), most candidates managed to identify the hormones correctly. Only a few candidates spelt wrongly the *prothoracicotropic* as *prothoracicotrophic* and *juvenile* as *juvanile*.

In part (*b*), majority of the candidates answered the question correctly. Both *corpora cardiaca* or *corpus cardiacum* were accepted as the answer.

In part (*c*), the candidates were required to explain how juvenile hormone modulates the activity of ecdysone. Few candidates were able to relate the concentration of juvenile hormone with ecdysone in their explanation. The candidates answered it as *when the level of juvenile hormone is low, larva is transformed to pupa*. The acceptable answer was *when the level of juvenile hormone is low or absent, ecdysone stimulates moulting or ecdysis and larva is transformed to pupa*.

In part (*d*), many candidates were able to answer correctly the growth pattern as intermittent growth. A few candidates spelt wrongly *intermittent* as *intermitent* or *intermmittent*, which were not accepted as the answer.

Question 17

The question was about the development of immunity. In part (*a*), majority of the candidates were able to answer correctly the type of immune response as cell mediated.

In part (*b*), most of the candidates knew the answers for *P*, *X* and *Y* but spelt wrongly the scientific terms which led to lost of marks. For instance, the candidates wrote the answers for *X* and *Y* as *interleukin I* and *interleukin II* instead of *interleukin 1* and *interleukin 2* respectively.

In part (*c*), only few candidates were able to answer and obtained full marks due to writing an incomplete answer. The candidates answered it as *macrophage engulfs the antigen* instead of *macrophage engulfs and digests the antigen*.

In part (*d*), few candidates were able to answer the question correctly. The acceptable answer was *Y activates or stimulates the proliferation of Q*.

In part (*e*), most candidates were able to answer it correctly. Only a few candidates spelt wrongly the *perforin* as *perforine*, which was not acceptable as the correct answer.

Question 18

In part (*a*), the question was about the transport system in vascular plants. Candidates were required to describe the movement of water in root tissues through apoplast, simplast and vacuolar pathways. Few candidates were able to describe the pathways clearly and in accordance with the answer scheme. For instance, in the apoplast pathway, candidates mentioned *apoplast pathway is the movement of water within the cell wall*. The acceptable answer was *apoplast pathway is the movement of water through spaces within the cell wall*. As for the vacuolar pathway, many candidates wrote *water diffuses through the vacuoles*. The acceptable answer was *water diffuses through the vacuoles of one cell to another*. There were also candidates that preferred to use the term *transport* instead of *diffuses* or *moves* in their answer explanation. In some cases, few candidates spelt wrongly Casparian strip as casparian strip, which was not accepted as the answer.

In part (*b*), the candidates were required to describe the cohesion-tension theory and transpirational pull which facilitates water transport in plants. Few candidates managed to answer this question accordingly and in the correct sequence of events for the transportation of water in plants. Majority of the candidates did not mention that *transpirational pull, cohesion and adhesion ensure continuous flow of water from roots to the leaves*. Some candidates gave depth explanation on the cohesion-tension theory without relating it to water transport in plants. There were also candidates who wrote *water potential in the leaves is reduced* instead of *water potential in the mesophyll cell is reduced*, which was accepted as the answer.

Question 19

In part (*a*), the question was about homeostasis. The candidates were required to describe the importance of regulating body temperature and blood osmotic pressure. Majority of the candidates only mentioned the importance of homeostasis in general without emphasising on the two factors mentioned. Some candidates answered it as *at high temperature*, *the enzyme will degenerate* instead of *at extreme temperature*, *the enzyme denatured*, which was the correct terms to use and acceptable as the answer. The terms such as *interstitial fluid*, *extracellular fluid* and *optimum* were rarely used in the candidates' answers.

In part (*b*), the candidates were required to explain the survivability of a healthy person even though the water consumption is low. Most candidates lost their marks in this question as they did not use the correct and specific terms in their explanation. For example, the candidates wrote *stimulates the pituitary gland to release ADH*, *water is reabsorbed*, and *concentrated urine is produced*. The acceptable answer was *stimulates the posterior pituitary gland to release more ADH*, *more water is reabsorbed into the blood capillaries*, and *small volume of concentrated urine is produced*. The explanation should be more specific as well as it must follows the appropriate sequence of events.

Question 20

In part (*a*), the question was about an infectious disease. Few candidates were able to define the infectious disease correctly. Furthermore, some candidates mentioned *infectious disease is transmitted by a vector* instead of *infectious disease is transmitted by pathogens through a vector*, which was acceptable as the answer. There were also candidates who mentioned *the disease is transmitted from a person to another person* instead of *the disease is transmitted from an infected person to an uninfected or a healthy person*, which was the correct answer.

In part (*b*), the question was about the transmission of malaria. Most candidates were able to answer this question and their explanations were satisfactory. Many candidates were unable to write the scientific nomenclature in an appropriate way. For instance, candidates wrote Anopheles as Anopheles, Plasmodium sp. as Plasmodium sp, and Plasmodium vivax as Plasmodium vivax. Some candidates were unable to differentiate between gametes and gametocytes. There were also candidates who mentioned *the liver cells burst* instead of *red blood cells burst* and *zygote forms sporozoites* instead of *zygote undergoes meiosis to form sporozoites*. The answers given by the candidates were rarely in a proper sequence of events which caused them to lose their marks on this question. The answer for this question should be explained in depth and candidates must use the proper scientific terms whenever required.

BIOLOGY (964/3)

OVERALL PERFORMANCE

For Semester 3 2018, 2 325 candidates sat the examination for this subject and 54.93% of them obtained a full pass.

The achievement of candidates for this subject according to grades is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	9.42	4.26	4.52	5.59	8.73	12.65	9.76	6.45	6.15	3.27	29.20

CANDIDATES' RESPONSES

SECTION A: *Multiple-Choice*

Answer Keys

Question number	Key	Question number	Key	Question number	Key
1	**D**	6	**D**	11	**C**
2	**B**	7	**B**	12	**D**
3	**B**	8	**A**	13	**C**
4	**C**	9	**A**	14	**D**
5	**C**	10	**B**	15	**A**

General comments

In general, Questions 6, 7 and 11 were in the range of easy questions. More than 65% of the candidates managed to answer them correctly. Meanwhile, Questions 2, 4, 5, 8, 9, 10, 12, 13, 14 and 15 were in the range of moderate questions with 40% to 60% of the questions could be answered by the candidates correctly. The easiest question was Question 11, in which 83% of the candidates were able to answer the question correctly. The most difficult question was Question 3, which was answered correctly by only 35% of the candidates.

SECTION B AND C: *Structure and Essay*

General comments

In general, the quality of the questions was very good. A well-balanced combination of Low Order Thinking Skills (LOTS) and High Order Thinking Skills (HOTS) questions that consist of factual recall and application of knowledge were applied. This facilitates in the differentiation between the low potential and high potential candidates. Easy to understand questioning methods facilitated the candidates to respond as expected in the open response question.

Comments on the individual questions

Question 16

The question was about growth curves of sambar deer population. In part (*a*), most candidates managed to identify phase *Y* and phase *Z* correctly. Only some candidates answered *lag* instead of *log* for phase *Y* as well as *linear* instead of *equilibrium/stationary* for phase *Z.*

In part (*b*), majority of the candidates answered the question correctly. However, only a few candidates were able to describe the growth rate. The suggested answer for phase *X* was *the population growth rate is slow due to few reproducing individuals/low population density*. The candidates answered *adapting to new environment* for phase *X* which was not accepted as the answer because the deer was not colonising any new environment. The suggested answer for phase *Y* was the *population growth rate is high due to natality being higher than mortality*. Many candidates wrote *population growth increases*, which was not accepted. The candidates' answers must be followed by the adverb *drastically* in order to be accepted.

In part (*c*), there were a significant amount of candidates who answered 125, which was not in the range of the accepted answer of 90-110. This was due to the fact that the students did not understand how to estimate the value of the carrying capacity correctly.

Question 17

The question was about the sex-linked genes (haemophilia in humans). In part (*a*), majority of the candidates were able to answer correctly the type of inheritance disease as *sex-linked/X-linked* inheritance. However, there were some candidates that answered it as *haemophilia* or *genetic mutation*, which were not accepted as the answer.

In part (*b*), most of the candidates were able to state the genotypes of Ali, Fatimah and Fatimah's father. Some of the common mistakes were the symbols of the gene that were mixed up between capitalisation as well as writing it correctly as superscript. Since the symbols representing the alleles were not given, any alphabets Aa-Zz were accepted as long as it was written as superscript of the X chromosome.

In part (*c*), most candidates answered ¼ as the possibilities of the son having haemophilia, which was not accepted as the answer. The correct answer was ½ of the possibilities of the son having haemophilia. As for the daughters, they were all normal individuals.

In part (*d*), few candidates did not write both genotypes required which caused them to lose marks. Inconsistency in using symbols representing the alleles was not given any marks due to different symbol would signify different genes. Candidates should write all the genotypes of the possible offspring, that were X^HY, X^hY for the sons and X^HX^h, X^HX^H for daughters.

Question 18

In part (*a*), the question was about the importance of taxonomy in biology. Even though the question looked simple, very few candidates were able to answer it correctly. Most candidates answered *to allow communication between scientists*, which was too general and could not be accepted as an answer. The answer *to determine/record the number of living organisms/species on Earth* was one of the optional answers that not many candidates were able to think about.

In part (*b*), the question was about the human activities that threaten the biodiversity in Malaysia. A lot of the candidates lose their marks as they did not use words such as *illegal* or *excessive* in their answer explanation. Furthermore, there were students who listed down all of the human activities that

were related and then, explained the consequences without matching it to the activities respectively. Hence, the candidates only obtained marks for the activities mentioned but did not get marks for the consequences. The candidates must explain their answers using the correct and accurate terms as well as to write the explanation in full sentences in order to obtain full marks.

Question 19

In part (*a*), the question was about the relationship of founder effect and genetic drift in the formation of a new species. The question required the candidates to apply their knowledge of the founder effect and related it to the genetic drift and speciation. Most candidates could not make a relationship between founder effect and the genetic drift, hence the candidates answered it separatedly. The candidates explained the founder effect first followed by the explanation of the genetic drift later on. Some candidates wrote that *genetic drift was caused by natural disasters*, which is true for the bottleneck effect but not for the founder effect. The founder effect occurs when a small number of individuals are isolated/dispersed from the larger/main population. A few candidates missed the word *small* as well as *larger* in their explanation. None of the candidates mentioned the fact that *the smaller the population, the larger the effect of genetic drift*.

In part (*b*), the candidates were required to describe the DNA fingerprinting technique. Some candidates answered *DNAs are cut using restriction enzyme forming restriction fragments length polymorphism* (RFLP) *and then run on a gel electrophoresis*, which was not accepted as the answer. RFLP is the technique, and it is not the name of the DNA fragments. Furthermore, a few candidates missed out the word *'same' restriction enzyme* in their explanation. There were also candidates that used the term *radioactive probe* instead of *DNA/genetic probe*. None of the candidates mentioned the technique used as the paternity test. In some answers given by the candidates, they wrote that *the DNA was taken/ obtained from the men and the baby*. The fact is that the DNA cannot be taken directly from human, but the DNA must be isolated or extracted from tissue samples such as blood or saliva.

Question 20

In part (*a*), the question was about cloning vectors. Most candidates were able to obtain full marks for this question. There were some candidates that used the term *agent* or *vehicle* in place of *DNA molecule* to describe the cloning vectors, which was not accepted as the answer. However, majority of the candidates were able to give the correct example of a cloning vector that was *plasmid/virus*.

In part (*b*), the question was about the production of insulin in humans. One of the common mistakes done by the candidates was that they did not write the letter 'c' in the cDNA, instead they just wrote DNA. Most candidates were able to get the steps correctly as it is a general step of producing insulin. Marks were only given to amplification process after screening.

PAPER 964/5 *(Written Practical Test)*

Question 1

The question was about the plant anatomy based on a cross section of a leaf. For part (*b*), few candidates were able to identify the structures of the leaf anatomy. Furthermore for part (*c*), few candidates were able to state the part of the cell involved in the processes as listed in the question. The candidates should have answered that carbon dioxide fixation and the formation of malate occur in the mesophyll cell whereas, Calvin cycle and carbon dioxide fixation by rubisco occur in the bundle sheath cell.

For part (*d*), none of the candidates gave a correct answer for this question. The candidates should have answered it as *the higher concentration or the larger size of chloroplast in the bundle sheath cell could contribute to a higher efficiency of photosynthesis*.

For part (*e*), the candidates were required to differentiate the photosynthesis in C_4 plant to the CAM plant, and most of the candidates could not answer the question properly. The candidates should have differentiated them in terms of the atmospheric carbon dioxide fixation as well as the location of carbon fixation and Calvin cycle took place.

Question 2

The question was about the anatomy of mammalian male uro-genital system. The question was the easiest in terms of difficulty. For part (*a*) and (*c*)(i), candidates were required to identify the structures of a given diagram. Most candidates were able to name the structures but none of them were able to identify correctly all of the structures.

For part (b), most candidates were able to answer these parts correctly with minimal mistakes. The candidates needed to provide two answers for the roles of *P* in male rat, which were *urine* and *sperm*. However, a few students only provided one answer, mostly urine, which caused them to lose marks for this question.

For part (*c*)(ii), few candidates were able to provide the correct answer. The candidates should have answered it as *aldosterone hormone is produced and plays a role in the regulation of the blood osmotic pressure*.

Question 3

The question was about the ecology of plant population that required the candidates to understand the sampling methods. Candidates were required to calculate some ecological parameters such as the frequency and relative density. For parts (*a*), (*b*) and (*e*)(i), most candidates were able to answer the questions correctly and accordingly to the answer scheme. For part (*c*), none of the candidates seemed to understand the frequency of a species in a quadrat sampling. Maybe, this was due to the formula for the calculation was not given or memorised by the candidates which led to poor performance of this part of question.

For part (*d*), the question required the candidates to calculate the relative species density for species *D*, *E* and *F*. Only a few candidates were able to provide the correct formula as well as made the correct calculation. For part (*e*)(ii), the question was about the basic knowledge of application of a sampling method. Few candidates were able to provide the correct answers such as *there is immigration and no emigration in a stable population* and *the marked individuals are not harmed*.

Laporan Peperiksaan STPM 2018

LAPORAN PEPERIKSAAN STPM 2018 BIOLOGY (964)

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