

Biology (964)

OVERALL PERFORMANCE

The number of candidates for this subject was 4669. The percentage of candidates who obtained a full pass was 71.86%, a decrease of 1.06% compared with the previous years.

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	3.32	5.87	9.36	13.75	13.35	13.98	13.58	9.25	7.02	5.68	4.84

RESPONSES OF CANDIDATES

PAPER 964/1 (MULTIPLE-CHOICE)

Keys

Question number	Key	Question number	Key	Question number	Key
1	A	18	C	35	A
2	B	19	B	36	C
3	B	20	D	37	C
4	D	21	B	38	B
5	B	22	B	39	A
6	C	23	C	40	A
7	D	24	D	41	C
8	C	25	C	42	A
9	B	26	A	43	D
10	A	27	B	44	A
11	D	28	C	45	D
12	D	29	B	46	A
13	C	30	D	47	B
14	D	31	A	48	A
15	A	32	B	49	D
16	A	33	C	50	C
17	D	34	C		

General comment

The mean score was 28.698 and there was a very good spread of scores with a standard deviation of 8.202. More than 80% of candidates answered questions 9, 21, 25, 27, 34, 38 and 41 correctly. Questions 1, 32, 35 and 40 was answered correctly by less than 30% of candidates. The rest of the questions fell in the medium range, with 30% to 80% of candidates obtaining correct answers.

PAPER 964/2 (STRUCTURE AND ESSAY)

General comments

In general, the candidates' answers were satisfactory in terms of planning and presentation. Only a few candidates managed to answer accordingly and systematically.

Comments on individual questions

Question 1

In part (a), most candidates' were able to answer System A and C and Product B correctly, but they gave the answer for Product D as NADPH only instead of NADPH + H⁺. They failed to recognize the importance of H⁺ ion.

In part (b), some of the answers given by the candidates were incomplete. For example, electrons become excited and released were written as electrons become excited. Some candidates only mentioned electrons are transferred to Pq and ATP is produced while the correct answer is electrons are transferred to Pq and Pc and ATP is produced. Some candidates used improper term such as photoexcited instead of photoactivated, and hydrolysis of water instead of photolysis of water. Apart from that some spelled out ferredoxin as ferrodoxin.

In part (c), most of the candidates were able to mention ATP and NADPH + H⁺ enter the stroma/Calvin cycle/dark reaction/light independent reaction, but many candidates did not mention their uses were to reduce CO₂ into glucose/carbohydrate.

Question 2

In part (a), most candidates were able to give the correct name of the hypothesis.

In part (b), most candidates identified the source as leaf instead of potato tuber. Beside that most candidates also identified root as sink correctly. Some candidates choose the other correct option that is shoot, but failed to include the keyword young/growing.

In part (c), some candidates only mentioned sucrose is transported into the sieve tube, but the answer required was sucrose is actively transported into the sieve tube. They also mentioned water enters the sieve tube instead of water from xylem enters the sieve tube by osmosis.

In part (d), several candidates mentioned the presence of companion cells in phloem without indicating the function of the cells that is to supply energy required for translocation or phloem loading.

Question 3

In part (a), most candidates were able to name hormones H, J and K correctly, but for hormone G, luteal progesterone and hormone I, placental progesterone were incorrect. This was because the candidates failed

to include the keywords luteal and placental. In some cases, they knew the hormones, but their names were wrongly spelt such as Human chorionic gonadotrophin was spelt out as 'Human chorion gonadotropine'.

Part (b) and (c) are dependent on part (a), therefore many candidates obtained very low marks for part (b) and (c). However, if the name of hormones *H* and *I* were wrongly spelt or the word placental were not included in the answer for hormone *I*, the candidates will be penalized for the names of hormones only. Marks also will be given to the candidates if the functions of hormones *H* and *I* were correct.

Question 4

In part (a), most candidates were able to name the method correctly as capture-recapture method.

In part (b), many candidates gave a general answer such as to allow them to mix with other population/dragonflies, but the correct answer was to allow them to mix randomly/evenly/freely with other population/dragonflies.

In part (c) many candidates were able to calculate the estimated population of the dragonfly. However, most candidates failed to obtain full marks because they either wrote the formula wrongly or did not include the formula as required.

In part (d) most candidates did well for this part.

In part (e) there were candidates who were unable to name the phylum correctly and even if they managed to do it correctly, it was spelt wrongly that is Artropoda, Athropoda or arthropoda instead of Arthropoda. The candidates also did not emphasise certain terms such as "chitinous" exoskeleton and "membranous" wings for the diagnostic features of dragonflies.

Question 5

In part (a), the candidates were required to describe the bonds and interactions which contribute to the tertiary structure of a protein. Most candidates were able to name the various bonds and interactions involved. However, many failed to explain how the bonds and interactions are formed thus, securing only half of the allocated marks. And yet some candidates included in their answers the description of primary, secondary and tertiary structures which were not required by the question. Some candidates were unable to explain the bonds correctly. For example, ionic bond as the bond between charged groups instead of the bond between oppositely charged side/R groups. Only a few candidates were able to explain that disulphide bridges are formed between two cysteine residues of the R-group.

In part (b)(i), most candidates were unable to define protein denaturation correctly. Many candidates only mentioned loss of specific form of the protein configuration without emphasising on the term "three-dimensional configuration".

In part (b)(ii), the majority of candidates failed to score well although they understood the topic thoroughly. This is because they did not write the word very/extreme/strong for the factors involved such as extreme heat, strong acid, strong alkaline and extreme pH. They were also supposed to mention the bond that was affected by the extreme heat/strong acid/strong alkaline/ heavy metal/detergent instead of describing it in general. For example, extreme pH disrupts or breaks the ionic bonds.

Question 6

In part (a), the candidates were required to explain the role of abscisic acid and potassium ions in controlling water loss by stomata under the condition of water stress. Many candidates were able to answer the question

correctly, but they did not obtain full marks because the answers given were incomplete. For example, they only mentioned potassium ions move out of the guard cells instead of potassium ions move out of the guard cells into the subsidiary cells. There were also some candidates who were confused between the guard cell and stoma. For example, water potential in the stoma increases instead of water potential in the guard cell increases. Terms such as “osmosis” was also not emphasised in the answers.

In part (b), the candidates were required to describe what happens to the various forms of CO_2 transported by the blood in the lungs. Answers given by most candidates were not well-planned or unsystematically described. The candidates should first mention the three forms of CO_2 that exist in blood before giving the details or elaborating them. Many candidates wrote CO_2 binds with H_2O forming carbonic acid instead of H^+ binds with HCO_3^- to form carbonic acid. Some candidates only mentioned CO_2 diffuses into the lungs instead of CO_2 diffuse out from blood into the alveolus.

Question 7

In part (a), candidates were required to state the functions of the different classes of antibodies. In order to obtain marks, candidates must give the correct answers for both classes of antibodies and their functions. The majority of candidates were able to give all the different classes of antibodies (Ig A, Ig M, Ig D, Ig G and Ig E), but failed to state each of the function correctly.

In part (b), candidates were required to describe how a woman's specific immune system responds to counter a viral attack. Many candidates answered this question without proper planning hence, the answers given were not well-organised and not clear. Some candidates wrote that macrophage digest virus, but the correct statement was macrophage engulf virus. Many candidates wrote that interleukin 1 and interleukin 2 as interleukin I and interleukin II. Some candidates gave wrong statements such as B cells differentiate into plasma cells instead of B cells differentiate into plasma cells and memory cells.

Question 8

The question is on the life cycle of *Pinus* sp and the importance of the life cycle of *Pinus* sp with respect to pollination and fertilization.

In part (a), the candidates were required to describe the life cycle of *Pinus* sp. Although the question was very clear, many candidates who attempted this question were unable to obtain good marks because the usage of the correct scientific terms were not emphasised. For example, microsporangium was written as microsporophyll, microspore mother cell was written as mother cells and microspore mother cell undergoes meiosis and forms microspores was written as microspore mother cell undergoes meiosis and forms microsporangium. Some statements given were incomplete such as megaspore mother cell produces megaspores instead of megaspore mother cells undergo meiosis to produce megaspore.

In part (b), the candidates had to explain the importance of the life cycle of *Pinus* sp. with respect to pollination and fertilisation. Many candidates failed to answer this question correctly which was due to lack of understanding of the question hence, answers given were incorrect. Some candidates explained the process of fertilisation in *Pinus* sp.

Question 9

In part (a), the candidates were required to define *test cross* and its uses. Very few candidates managed to give the definition correctly, others gave incomplete or wrong definitions. Some defined *test cross* as a cross between an individual with another individual which is homozygous recessive. The correct definition was a cross between an individual of unknown dominant genotype with an individual which is homozygous

recessive for the genes in question. However some candidates failed to use the correct terms such as homologous instead of homozygous.

In part (b), candidates were required to illustrate the test cross on the F_1 generation (both genotypes and phenotypes). The majority of candidates were not able to obtain high marks. Their main weakness was their inability to identify the involvement of linked gene. Candidates also did not understand the specific requirement of the question. Hence, they answered by illustrating the test cross of F_1 progeny without showing linked genes.

In part (c), candidates were required to calculate the distance between the two genes involved. Some candidates wrote the formula wrongly as

$$\frac{\text{total no. of recombinant phenotype}}{\text{total no. of progeny}} \times 100\% \text{ instead of } \frac{\text{total no. of recombinant phenotype}}{\text{total no. of progeny}} \times 100$$

Apart from that some failed to include the unit correctly in their answers.

Question 10

In part (a), a majority of candidates were able to partially describe the term “binomial nomenclature”. However, many were unable to state its benefits correctly. None of the candidates were able to spell the name of the developer of the system, Carolus Linnaeus/Carl Linnaeus correctly.

In part (b)(i), nearly all the candidates were not able to give the meaning of taxonomic hierarchy as required.

In part (b)(ii), the candidates had to rank the taxonomic levels of tiger cowrie according to the Linnaeus taxonomic hierarchy. Very few candidates were able to rank all the levels correctly. Some candidates did not emphasise on the correct way of writing scientific names. For example, Animalia was written as animalia. Most candidates did not underline the generic and specific names (since their answers were hand-written), even though they explained correctly in part (a) that the generic and specific names must be italicised when type-written or underlined when hand-written.

PAPER 964/4 (WRITTEN PRACTICAL TEST)

General comments

In general, the performance of this year’s candidates was the same with the performance of previous year’s candidates.

Comment on individual questions

Question 1

In part (a), most candidates were unable to name structures A, B, C, D, E and F correctly. The answers are A is an epidermis, B is a mesophyll cells, C is a bundle sheath cells, D is a vein or vascular bundle, E is a chloroplast and F is a stoma.

In part (b), majority of the candidates were unable to state the main difference between leaf structure C_3 and C_4 plants.

In part (c) some candidates lost marks because their answers were not complete and wrongly spelt. For example, the correct answers were RUBP Carboxylase and PEP Carboxylase, but the candidates’ answers were RuBP Corboxylase, RuBP, PEP, PEP Corboxylase and etc.

Question 2

In part (a), most candidates were able to name the structures labelled *J*, *K*, *N* and *O* except for *M* which is a ventricle septum.

In part (b), most candidates were not able to state the functions of structures labelled *L* and *M* correctly which is to prevent blood back flow.

In part (c), most candidates were not able to state the differences of oxygen concentration in blood found in chambers *A*, *B*, *C* and *D*, the answers were *A* and *C* are low; *B* and *D* are high.

In part (f), most candidates were not able to state where *P* wave, *QRS* complex and *T* wave take place correctly and they were also not able to state the processes involved.