

BIOLOGY

SUBJECT 9190

PAPER 2

SECTION A

QUESTION 1 (a)

Most candidates managed to correctly identify the structure labelled P as cholesterol.

The structure labelled Q proved to be difficult for the majority of the candidates. Responses such as channel pore, ion pore and protein pore were common from most candidates. Q was Hydrophilic Channel.

QUESTION 1 (b)

Majority of the candidates managed to state correctly the function of the glycocalyx as for cell recognition/cell-cell adhesion, cell identity markers.

QUESTION 1 (c)

Most candidates struggled to obtain all marks as they failed to explain why the fluid mosaic model is known as fluid mosaic model. Candidates were supposed to highlight that the protein resembling a mosaic and also that the phospholipids bi-layer is fluid.

QUESTION 1 (d)

Features such as size, fat or water solubility/polarity or charge were common but the third feature of specific sites – which allow the carrier proteins in the cell membrane to recognize the substance was not eluded.

QUESTION 2 (a)

Majority of the candidates managed to indicate the number of carbon atoms in glycerol and glucose as 3 and 6 respectively.

QUESTION 2 (b) (i)

Very few candidates failed to give the correct explanation, that his depends on the nature of the fourth group attached to the α -carbon atom or just the composition of the R-group.

QUESTION 2 (b) (ii)

This part of the question was not well answered by the majority of the candidates. The explanation was supposed to include the proportions of amylase and amyl pectin which vary in different plants, hence the number of carbon atoms variation.

QUESTION 2 (c)

Candidates were able to indicate that water molecule is released, but could not go further to highlight that a glycoside bond is formed.

QUESTION 3 (a)

Candidates managed to name all the three components of DNA correctly; as deoxyribose sugar, phosphate and organic base.

QUESTION 3 (b)

Majority of the candidates managed to state the differences between the four types of nucleotide in DNA correctly. Responses given include; purines (double ringed); pyrimidines (single-ringed) and that these derive the nitrogenous bases from the different organic bases.

QUESTION 3 (c)

Very few candidates failed to describe the semi-conservative replication of DNA. They described the experiment carried out to show that duplication is semi-conservative instead of the actual DNA duplication showing semi-conservative.

QUESTION 3 (d)

A well answered question by most candidates highlighting the importance of genetic stability in growth and repair of worn out cells.

QUESTION 4 (a) (i)

Majority of the candidates managed to correctly define the term codominance indicating that it is whereby two alleles fail to dominate each other in heterozygosis and the effects of both alleles are found/noted in the offspring.

QUESTION 4 (a) (ii)

Most students failed to come up with suitable symbols to denote the alleles for coat colour. Symbols such as RR for Red and rr for white are confused in codominance. The case of different letters and superscripts should be encouraged. The correct symbols were R for red and W for white or C^r for red and C^w for white.

QUESTION 4 (b)

Candidates confused a genetic diagram and a Punnett square. A well labelled genetic diagram was accepted with all gametes being shown and the different combinations shown. A full genetic diagram was required in this question.

QUESTION 4 (c)

Majority of the candidates who failed to get part (b) above correct also failed to come up with the expected genotypes of the calves. Roan bull crossed with a roan cow would produce a phenotypic ratio of 1 red: 2 roan: 1 white.

QUESTION 5 (a) (i)

A well answered question by most candidates except for a few who indicated the location of Krub's cycle in the cell as the matrix. The correct answer was the mitochondrion.

QUESTION 5 (a) (ii)

Most candidates failed to collect maximum points as they left h part hat hydrogen atom combine with oxygen. Candidates were supposed to indicate the product of the reduction of hydrogen ions by electrons, that is, the hydrogen atom.

QUESTION 5 (b)

Very few candidates managed to explain why ATP is used as an energy currency for cell metabolism. Points such as: ATP is mobile, easily hydrolyzed and energy released in small or manageable quantities were not clear in most responses.

QUESTION 5 (c)

Most candidates failed to realize that the question asked for the uses of energy from ATP in a liver cell and preferred to write uses of energy from ATP in general.

QUESTION 6 (a) (i)

This was an easy question to most candidates, naming the process as osmosis.

QUESTION 6 (a) (ii)

This was another easy question which most candidates got correct as apoplast pathway.

QUESTION 6 (b)

This proved to be a difficult question, with majority of the candidates. The presence of the waxy substance made of suberin (casparian strip) in the radial walls of the endodermal cells prevents movements of water via cell walls. The water would then move via the symplast pathway.

QUESTION 6 (c)

This was a fairly answered question, with majority of candidates managing to get at maximum points. Candidates managed to explain the changes in rate of flow during the day, including points such as closure of the stomata at the end of the day and a decline in light intensity and temperature.

QUESTION 7 (a)

Majority of the candidates managed to identify structures A and B correctly as chromatid and spindle fibre respectively.

QUESTION 7 (b) (i)

Candidates showed that they are very familiar with stages of cell division by managing to label correctly the type of division as mitosis. However, very few identified the stage as meiosis.

QUESTION 7 (b) (ii)

The stage of division was a bit confusing to most candidates who put it as anaphase. The correct stage of division was late metaphase.

QUESTION 7 (c) (i)

Candidates who managed to answer (b) (i) correctly also managed to state the significance of the division in cell 2. Candidates were supposed to realize that the type of division shown by cell 2 is meiosis, so the significance of this type of division was required.

QUESTION 7 (c) (ii)

Either the ovary or testis was the correct organ.

QUESTION 8 (a) (i) & (ii)

Majority of the candidates were not able to correctly identify the zygote and the endosperm from the figure. On the diagram, zygote was structure labelled C and the endosperm was B.

QUESTION 8 (b)

This was an easy question to most candidates. However, some candidates failed to come with structural differences between an insect-pollinated flower and a wind-pollinated flower. Candidates forgot to dwell on structural differences.

QUESTION 8 (c)

Majority of the candidates just stated the mechanisms which present self-fertilization in flowering plants. Candidates listed protandry, protogyny and self-incompatibility and did not go on to describe how the mechanism prevents self-fertilization.

QUESTION 9 (a)

The type of growth curves were not correctly identified by the majority of the candidates. Growth curve A was identified by some candidates simply as growth curve, the same applies to growth curve B. The correct name to growth curve A is absolute growth rate curve and B is absolute actual growth curve.

QUESTION 9 (b)

Most candidates correctly described the shape of graph B as sigmoid or S-shaped.

QUESTION 9 (c)

Very few candidates managed to get maximum points on this question. Most candidates failed to explain why there was negative growth immediately after germination. This negative growth could be attributed to respiration which took place during the germination resulting in breakdown of materials to generate energy, resulting in loss of mass. Soon after germination, rate of respiration exceeds the rate of photosynthesis. In addition, at first there is no photosynthesis.

SECTION B

QUESTION 10 (a)

Candidates struggled to describe the molecular structure of an enzyme. Some candidates resorted to drawing the structure of the enzyme which was not helpful in answering the question. Candidates were supposed to include points such as the complex 3-Dimensional structure of the enzyme, globular protein with regular sequences of amino acids making polypeptide chains which fold extensively, have few catalytic amino acids which make up a region called the active site and the H tertiary structure is maintained by disulphide, ionic, hydrogen and hydrophobic interactions.

QUESTION 10 (b)

A fairly attempted question with the majority of the candidates managing to score high marks. Candidates managed to explain the effects of temperature on enzyme activity both on increase or a decrease in temperature.

QUESTION 11 (a)

Very few candidates managed to relate the general features of a hormone to insulin. Most candidates generalized the features of a hormone and failed to link them to insulin as required by the question. However, candidates left the point that the target site for insulin is the liver cell or muscle cells.

QUESTION 11 (b)

A well answered question by the majority of the candidates. However, candidates left out to mention that a diabetic patient should also take regular exercises in trying to maintain normal blood sugar levels.

QUESTION 12 (a)

A common question to the majority of the candidates. However, the answers given were not comprehensive. Most candidates came out with a flow diagram of the nitrogen cycle. The aspect of de-nitrification was not clearly covered in the responses given and also industrial processes such as the Harber process.

QUESTION 12 (b)

A fairly answered question with wide ranging responses from candidates. However, responses such as blue-baby syndrome, oxidation fertilizers containing compounds resulting in soil acidification and loss of crumb structure of soil, were left out by the majority of the candidates.

QUESTION 13 (a)

A well answered question with the majority of the candidates scoring full marks, however, the point that their blood fills their body cavity and bathes the organs directly was not written by all most all candidates who attempted this question.

QUESTION 13 (b)

An easy question as well and well answered by the candidates. Full marks were scored in this question and candidates managed to fully describe the main outstanding features of the organisation belonging to the class Monocatyedoneae.