

**Marking Guide**

**BIOLOGY**

**UNITS 1 & 2**

**2021**

**Section One: Multiple-choice 30% (30 marks)**

|  |  |
| --- | --- |
| **Question** | **Answer** |
| 1 | c |
| 2 | c |
| 3 | a |
| 4 | d |
| 5 | b |
| 6 | a |
| 7 | a |
| 8 | c |
| 9 | a |
| 10 | a |
| 11 | d |
| 12 | c |
| 13 | b |
| 14 | c |
| 15 | a |
| 16 | c |
| 17 | b |
| 18 | b |
| 19 | a |
| 20 | d |
| 21 | c |
| 22 | c |
| 23 | b |
| 24 | d |
| 25 | a |
| 26 | c |
| 27 | b |
| 28 | d |
| 29 | a |
| 30 | d |

**Section Two: Short answer 50% (100 Marks)**

**Question 31 (20 marks)**

(a) List **four** properties common to all enzymes. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **Any four of** | |
| * Not part of reaction * Re-usable * Specificity to substrates * Composed of protein/are organic * They are biological catalysts/speed up rate of chemical reactions * Have an optimum temperature * Have an optimum pH * Possess active sites | 1-4 |
| **TOTAL** | **4** |

(b) Identify the structures on the diagram labelled: (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| A - Substrate | 1 |
| B – Active site | 1 |
| C - Enzyme | 1 |
| D – Product/s | 1 |
| **TOTAL** | **4** |

(c) Two accepted models are used to explain the action of enzymes. Identify the model best represented by the flowchart above, giving reasons for your choice. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Represents Lock and Key model best | 1 |
| Active site has not changed shape to accommodate substrate | 1 |
| Induced Fit Model would need to show a change in active site shape to accommodate substrate | 1 |
| **TOTAL** | **3** |

(d) Pepsin is an enzyme that breaks down proteins. It is produced in the stomach lining of carnivorous mammals. Explain why pepsin works efficiently in the stomach but slows in activity after leaving the stomach. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| The stomach is a highly acidic environment | 1 |
| therefore, pepsin works optimal in acidic conditions | 1 |
| Pepsin leaves the stomach and enters the small intestine where the pH is higher/more alkaline | 1 |
| Pepsin’s active site changes shape due to pH change so enzyme action activity is reduced | 1 |
| **TOTAL** | **4** |

(e) Describe the difference in structure between the digestive systems of ruminant animals

(such as cows and goats) and animals such as humans, dogs and pigs. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| * Monogastric animals have a simple stomach while ruminants have a four chambered stomach | 1 |
| * Monogastric animals have a relatively short gut whereas ruminants have a longer gut | 1 |
| **TOTAL** | **2** |

1. Explain why the ruminant gut is suited to animals that have an herbivorous diet.

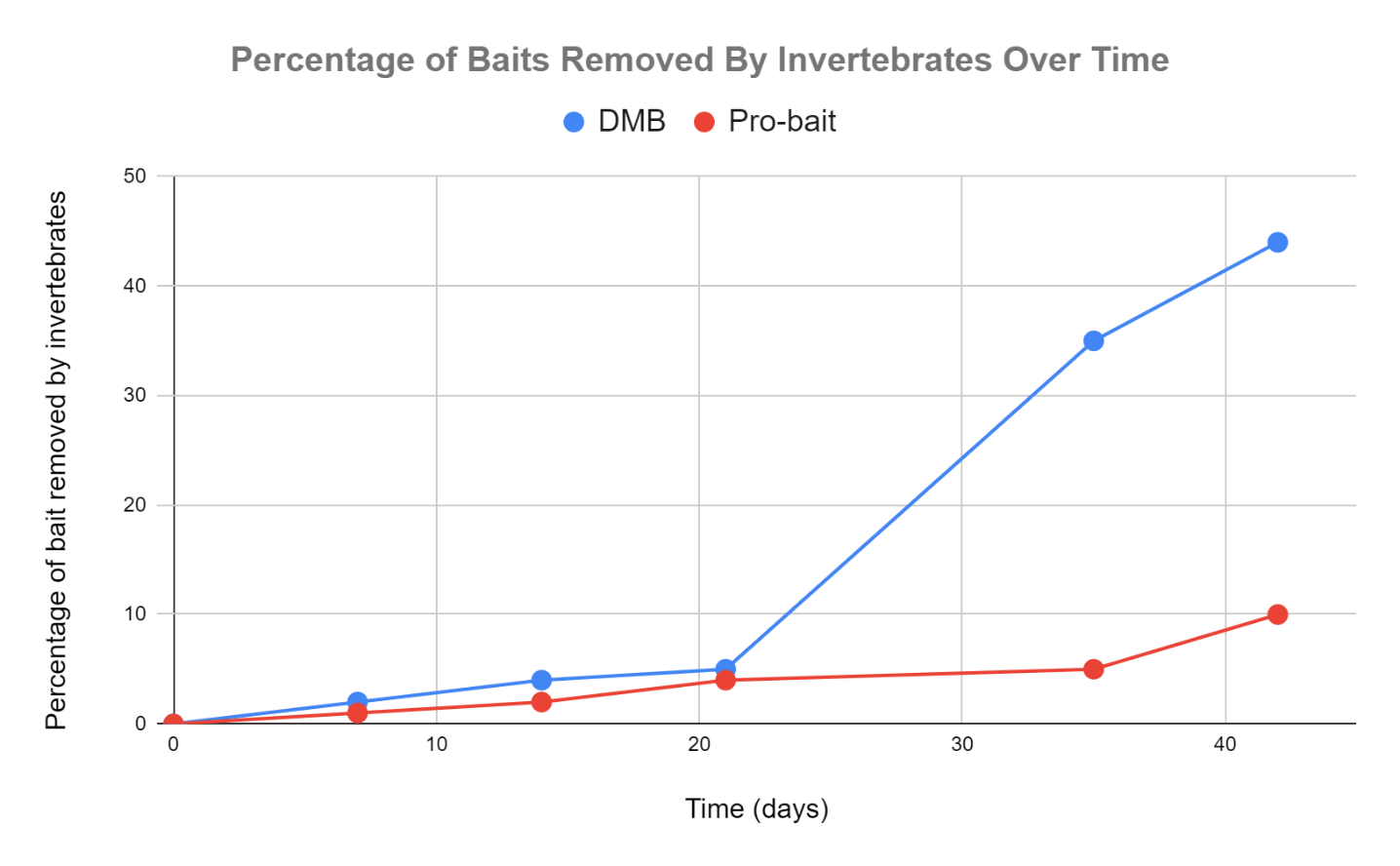
(3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| * Ruminants constantly eat a large amount of vegetation consisting of roughage(fibre) so they require a longer/larger gut | 1 |
| * Roughage/fibre is not digested by digestive enzymes | 1 |
| * Ruminants rely on microbial fermentation to digest roughage | 1 |
| **TOTAL** | **3** |

**Question 32 (20 marks)**

1. Graph the percentage of bait removed for DMB and Pro-bait against time.

(6 marks)



|  |  |
| --- | --- |
| **Description** | **Marks** |
| Title (must include independent and dependant variables) | 1 |
| Appropriate scale | 1 |
| Correct axis | 1 |
| Accurate labelling including units | 1 |
| Data plotted accurately and joined as a line graph | 1 |
| Data plotted separately for DMB and Pro-bait and key/legend included | 1 |
| **TOTAL** | **6** |

(b) Estimate the percentage of bait removed for DMB at (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| 28 days: 20% | 1 |
| 49 days: 53% | 1 |
| **TOTAL** | **2** |

(c) In which estimate (28 days or 49 days) do you have the greater confidence? Give a reason for your answer. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| At 28 days | 1 |
| Data at 28 days is interpolated/has data on both sides of this time unlike 49 days which involves extrapolation with data only on one side of this time. | 1 |
| **TOTAL** | **2** |

(d) What is the independent variable in this study? Give a reason for your answer.

(2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| The type of bait used i.e., DMB/Pro-bait | 1 |
| This is the variable being manipulated by the biologist | 1 |
| **TOTAL** | **2** |

(e) State **one** way of improving the reliability of this investigation. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Increase number of Pro-bait and DMB baits  OR  Repeat trials | 1 |
| **TOTAL** | **1** |

(f) Propose a hypothesis for this study. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **Must include independent and dependant variables in hypothesis and relate purely to the data in the table** | |
| E.g. - Pro-baits receive less reduction of percentage mass due to invertebrates than DMB baits | 1 - 2 |
| **TOTAL** | **2** |

(g)  Identify **three** variables that were controlled by the biologists.

(3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Suggestions include: |  |
| Composition of baits within bait types | 1 |
| All baits placed in conservation zones | 1 |
| All baits made inaccessible to larger species | 1 |
| **TOTAL** | **3** |

1. Based on the results which type of bait would most likely be favoured in the control of fox populations? Give a reason for your choice. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Pro-bait | 1 |
| Pro-bait shows greatly reduced removal by invertebrates over the long term than DMB baits. | 1 |
| **TOTAL** | **2** |

**Question 33 (20 marks)**

(a) Name the structure of an earthworm that allows gas exchange between the internal and external environment. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Skin | 1 |
| **TOTAL** | **1** |

(b) Define the term ‘spiracle’.

(1 mark)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| An external respiratory opening on the body of insects/spiders | 1 |
| **TOTAL** | **1** |

1. Identify **two** ways that the gas exchange system of a frog and bony fish are

different. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Frogs have skin  OR lungs | 1 |
| Bony fish have gills | 1 |
| **TOTAL** | **2** |

1. Identify **two** ways that the gas exchange system of a frog and bony fish are

similar. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **Gas exchange surfaces in frogs and bony fish:** |  |
| have a rich network of blood capillaries | 1 |
| require moisture for effective gas exchange | 1 |
| **TOTAL** | **2** |

1. Give an example of an animal with a closed circulatory system. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| any vertebrate, annelid or cephlapod | 1 |
| **TOTAL** | **1** |

1. Give an example of an animal with an open circulatory system. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| any arthropod | 1 |
| **TOTAL** | **1** |

1. Describe **two** differences between open and closed circulatory systems. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **Any two points from below (2 marks each). Comparison must be made between each type of system for two marks to be awarded.**  Differences:   * Open circulatory systems circulate fluid in a cavity called a hemocoel while closed systems have blood contained with blood vessels and a heart * In open systems the circulating fluid is known as haemolymph while in closed systems the fluid is known as blood * In closed systems the hemocoel bathes the organs directly with oxygen and nutrients while in closed systems blood is directed to organs that require it   Blood/haemolymph in open circulatory systems flows at a lower pressure compared to closed circulatory systems where the blood flows at a greater pressure through closed vessels  Open circulatory systems do not regulate the volume of blood flow through tissues and organs whereas closed circulatory systems the volume of blood is regulated by arteries and vessels   * Open circulatory systems are slower/less efficient at circulating materials compared to closed circulatory systems which are faster/more efficient | 1-4 |
| **TOTAL** | **4** |

(e) The Titan Beetle (*Titanus giganteus*) is thought to be the largest of all insects, growing to over 16cm in length. Explain why insects are not able to grow to larger sizes. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Insects use tracheal tubes for gas exchange | 1 |
| Gas is exchanged via the tracheal tubes by diffusion | 1 |
| Gas exchange for large body via longer tracheal tubes would be too slow/inefficient in supplying oxygen and eliminating carbon dioxide | 1 |
| As insects become larger their SA/volume ratio becomes smaller | 1 |
| **TOTAL** | **4** |

1. Explain how gas exchange in plants can be affected by their level of hydration.

(4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| When a plant is hydrated its guard cells become turgid and the stomata open | 1 |
| When stomata are open gas exchange between the plant and atmosphere can happen readily | 1 |
| When a plant is dehydrated/low in water its guard cells become flaccid and the stomata close | 1 |
| When stomata are closed gas exchange between the plant and atmosphere stops/is limited | 1 |
| **TOTAL** | **4** |

**Question 34 (20 marks)**

(a) Define the term ‘carrying capacity’. (2 mark)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| The carrying capacity of an environment is the maximum population size of a biological species that can be sustained by that specific environment for an extended period of time.  **Need to mention extended period of time for full marks.** | **1-2** |
| **TOTAL** | **2** |

1. In 1841 Gilbert’s potoroos were often seen accompanied by quokkas. Based on this observation, some speculated both species had identical diets. Explain why this is unlikely. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| The competitive exclusion principle tells us that two species cannot have the same niche in the same habitat | 1 |
| One species will outcompete the other leading to extinction of one species | 1 |
| **TOTAL** | **2** |

(c) Describe the steps required to calculate an estimate of the Gilbert’s potoroo population using the capture-recapture method. (5 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Capture and tag individuals | 1 |
| Release back into the environment | 1 |
| Allow enough time for individuals to disperse | 1 |
| Recapture and record number of tagged/untagged individuals | 1 |
| Calculate estimated population using Lincoln Index | 1 |
| **TOTAL** | **5** |

(d) Identify and describe **two** conservation strategies that could be implemented to restore potoroo populations and their habitat. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **Any two points from below. 1 mark for identifying a strategy and 1 mark for a description of strategy. A maximum of 2 marks per point.** |  |
| Captive breeding programs – capture individuals and then maintain in zoos and other facilities to build a healthy population | 1-2 |
| Revegetation of species habitat – Re-establish native vegetation so that potoroo are able to find food and shelter when individuals are eventually reintroduced | 1-2 |
| Gene banks – Sperm and eggs are collected and frozen to allow for the possible use of a similar species as a surrogate later | 1-2 |
| Control of introduced predators – Baiting/trapping/elimination of predator species directly lowers the incidence of potoroos being killed | 1-2 |
| Management strategies, including protected areas and restricted commercial and recreational access - Such areas minimise the effects of human activity such as pollution, hunting, habitat damage from vehicles, dieback, thus maintaining the habitat of the potoroo | 1-2 |
| **TOTAL** | **4** |

(e) Explain why it is good practice to have more than one fertile male in an animal breeding program. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Use of more than one breeding male leads to increased genetic diversity | 1 |
| Use of only one breeding male can result in unhealthy genetic traits in the male being carried to all offspring | 1 |
| Use of only one breeding male may result in a high proportion of offspring being susceptible to a particular virus/disease that may hit the population | 1 |
| Use of only one breeding male can result in an increase in still births and deformities in future generations | 1 |
| **TOTAL** | **4** |

1. Briefly describe the three strategies that form the basis of ethics guidelines in animal research. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Replacement: Find alternatives to using animals where possible | 1 |
| Reduction: Reduce the use of animals to as low a level as statistically necessary | 1 |
| Refinement: Decrease the incidence of inhuman practices with remaining animals during investigations | 1 |
| **TOTAL** | **3** |

**Question 35 (20 marks)**

(a) Identify the name of (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Organelle 1: Mitochondria | 1 |
| Organelle 2: Chloroplast | 1 |
| Structure 1: Stroma | 1 |
| Structure 2: Thylakoid/grana/granum | 1 |
| **TOTAL** | **4** |

1. Arrows A and B indicate the exchange of substances between the two organelles. Name **two** substances represented by (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Arrow A: oxygen, glucose | 1-2 |
| Arrow B: water, carbon dioxide | 1-2 |
| **TOTAL** | **4** |

(c) Identify the molecule that is known as the “molecular unit of currency” of energy transfer in organisms and describe **two** features of the molecule that make it ideal for this purpose. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| ATP/Adenosine triphosphate | 1 |
| Small molecule so easy to transport around cells | 1 |
| Contains a high amount of energy for size | 1 |
| **TOTAL** | **3** |

(d) Complete the table below. (4 marks)

|  |  |  |
| --- | --- | --- |
| Stage of photosynthesis | Products | Location within chloroplast |
| Light dependent | ATP, NADPH | Thylakoid membranes |
| Light independent | Sugars/starch/glucose | fluid-filled space of the chloroplast (stroma) |

(e) With respect to metabolism explain the advantage of the folded and stacked membranes as illustrated in the diagram. How would a reduction in the folding of membranes affect the function of these organelles? (5 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Folding of membranes increases the amount of surface area for reactions to occur | 1 |
| Increased reaction rate allows for higher metabolic rate | 1 |
| Decreasing SA in mitochondria would result in lower rate of aerobic respiration making the mitochondria less efficient | 1 |
| Decreasing SA in chloroplast thylakoid membranes would result in lower production of ATP/NADH | 1 |
| A decrease in ATP/NADH production would then decrease the production of sugars during light-independent phase of photosynthesis | 1 |
| **TOTAL** | **5** |

**End of Section Two**

**Section Three: Extended answer 20% (40 marks)**

This section contains **four (4)** questions. You must answer **two (2)** questions; **one (1)** from Unit 1 and **one (1)** from Unit 2.

**Unit 1**

Choose **either** Question 36 **or** Question 37.

**Question 36 (20 marks)**

(a) Symbiotic relationships can be categorised into three types. Use examples to outline these **three** types and explain why collaboration is not categorised as a symbiotic relationship.

(10 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Identifies mutualism as a type of symbiotic relationship | 1 |
| Describes mutualism as a relationship between organisms of two different species in which each benefits | 1 |
| Gives an example of mutualism e.g., birds such as the New Holland Honeyeater, feed on the nectar from flowers. As they try to reach the nectar, pollen may get on their beak. Both organisms benefit from this relationship because the bird receives food and the flower benefits from pollination by the bird | 1 |
| Identifies commensalism as a type of symbiotic relationship | 1 |
| Describes commensalism as a relationship between two organisms in which one benefits and the other derives neither benefit nor harm | 1 |
| Gives an example of commensalism e.g., Kangaroos live under or in trees. Trees provide shelter and shade for the kangaroo. The trees receive no benefit from the relationship | 1 |
| Identifies parasitism as a symbiotic relationship | 1 |
| Describes parasitism as a relationship between two species of plants or animals in which one benefits at the expense of the other, sometimes typically without killing the host organism | 1 |
| Gives an example of parasitism e.g., kangaroos are susceptible to ticks. The ticks obtain food from the kangaroo’s blood. The kangaroo is harmed from the blood loss and the tick gets food and shelter | 1 |
| Collaboration is not classed as a symbiotic relationship because collaboration involves individuals from the same species while symbiotic relationships involve two different species | 1 |
| **TOTAL** | **10** |

(b) Identify **five** human activities that can adversely affect biodiversity within ecosystems. Outline how each activity can lead to reduced biodiversity.

(10 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Identifies habitat destruction, fragmentation, or degradation | 1 |
| Destruction of habitat can result in species being destroyed or displaced from the area with subsequent flow-on effects to the rest of the ecosystem food web. Decreased species in an area leads to decreased biodiversity. | 1 |
| Identifies introduction of invasive species | 1 |
| Invasive species can predate on native species. Native animals may have to compete with introduced animals for prey. Introduced plants may compete for space/light. Invasive species may also be parasitic. All of these factors lead to destruction, death, or displacement of native species. | 1 |
| Identifies burning of fossil fuels | 1 |
| Burning of fossil fuels leads to climate change. This includes changes in rainfall and temperature which leads to the destruction of existing species and replacement with species more suited to the new climate. This may reduce existing population numbers and hence biodiversity. | 1 |
| Identifies introduction of pollutants to ecosystems, biomagnification | 1 |
| Pollutants can lead to changes in such factors as soil and water body pH which can affect native producers and hence species higher in the food web. Biomagnification can lead to reduced numbers of top order predators with subsequent flow-on effects to the food web. | 1 |
| Identifies unsustainable use of natural resources | 1 |
| Timber logging of native species reduces habitat and food source for native species. Over-fishing reduces food supply for organisms within ecosystem thus affecting native food webs. Redirecting water for irrigation and human consumption all have effects on vegetation, habitat, and food web of native ecosystems. Each activity changes native population numbers in an ecosystem thus reducing biodiversity. | 1 |
| **TOTAL** | **10** |

**Question 37 (20 marks)**

(a) Explain, with the aid of an annotated diagram, how carbon is cycled between the biotic and abiotic components of an ecosystem. (10 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Carbon dioxide from the atmosphere is stored in producers through the process of photosynthesis | 1 |
| Some organisms do not decay rapidly so the carbon is stored as wood, soil carbon, peat, in sediments. Some are eventually converted to fossil fuels in the lithosphere | 1 |
| Decaying organisms release carbon dioxide into the atmosphere | 1 |
| Carbon dioxide is stored by dissolving in the waters of the Earth | 1 |
| Burning of fossil fuels and bushfires release carbon into the atmosphere as carbon dioxide | 1 |
| Carbon is incorporated into the sea creatures as carbonates | 1 |
| Carbonate from the structures of dead creatures can become stored in limestone | 1 |
| Respiration by organisms releases carbon dioxide to the atmosphere | 1 |
| Carbon moves through food chains | 1 |
| Uses an annotated diagram to illustrate carbon cycle | 1 |
| **TOTAL** | **10** |

(b) All ecosystems can be divided into two major categories.

(i) Identify and describe the two categories

(ii) Identify **two** types of ecosystems within each major category. Discuss the abiotic and biotic factors particular to each of these ecosystems.

(10 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **Part (i)** |  |
| Ecosystems can be divided into terrestrial or aquatic ecosystems | 1 |
| Aquatic ecosystems dominated by water while terrestrial ecosystems are dominated by land | 1 |
|  |  |
| **Part (ii)** |  |
| **Terrestrial ecosystems (Maximum 4 marks for two different terrestrial ecosystems). Examples below.** |  |
| Desert: arid, Sparse vegetation, number of insect and other animals relatively limited. Example: Simpson Desert | 1-2 |
| Tropical Rainforest: High precipitation, high average temperatures, dense vegetation, prolific wildlife in canopy, high species biodiversity. Example: Daintree | 1-2 |
| Grasslands: semi-arid, wide and treeless expanses, may contain grazing animals, dominated by grasses. Example: Pilbara grasslands | 1-2 |
|  |  |
| **Aquatic ecosystems (Maximum 4 marks for two different aquatic ecosystems). Examples below.** |  |
| Littoral Zones: shallow, often turbulent due to wave action, seaweed, crabs and molluscs may be present in relatively large numbers. Extends from the high water mark to the permanently submerged are on the shoreline | 1-2 |
| Stillwater ecosystem: Stagnant or very slow flowing stagnant or very slowly flowing waters. Lakes, ponds, bogs, freshwater and saltwater marshes. Often with low oxygen levels, free floating plants, algae. | 1-2 |
| Coral reef: characterised by reef building corals. Mostly in warm, shallow and clear agitated waters. High biodiversity with many fish, molluscs, crustaceans, echinoderms, sponges, tunicates and other cnidarians. | 1-2 |
| **TOTAL** | **10** |

**Unit 2 (20 marks)**

**Question 38**

(a) Organisms are formed from an array of complex structures which are composed of biological molecules (biomolecules). Discuss **three** of these biological molecules in terms of the monomers that compose them and their importance within organisms. (10 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Identifies **carbohydrates** as a biomolecule | 1-10 |
| Composed of carbon, hydrogen, oxygen or monosaccharides |
| *A total of* ***2 marks*** *can be allocated from the points outlined below.*   * A primary energy source for the body * Undigested carbohydrates form fibre to aid gut health * Cellulose as a carbohydrate provides structure for plants * Used to form glycoproteins and glycolipids in cell membranes |
| Identifies **lipids** as a biomolecule |
| Composed of carbon, hydrogen, oxygen or glycerol and fatty acids |
| *A total of* ***2 marks*** *can be allocated from the points outlined below.*   * Provide physical protection to organs * Provide insulation from cold * Storage of energy within organism * Absorption of fat-soluble vitamins * Essential in the formation of many hormones * Main component of cell membranes |
| Identifies **proteins** as a biomolecule |
| Composed of amino acids |
| *A total of* ***2 marks*** *can be allocated from the points outlined below.*   * Provide support to structures skin and nails as collagen, elastin, keratin * Enzymes are formed from protein which are necessary for chemical reactions * Transport and store substances e.g. haemoglobin carries oxygen * Used as an energy source by the body * Immunity. Used to form antibodies to fight bacteria and viruses |
| **TOTAL** | **10** |

(b) Explain the processes involved with moving water through a vascular plant starting from soil and ending at a stomate. (10 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| * Water enters the plant through root hairs | 1 |
| * Root hairs increase water uptake due to high SA/V ratio | 1 |
| * Water moves through vascular plants via xylem vessels | 1 |
| * Adhesive and cohesive forces draw water through xylem | 1 |
| * Root pressure due to an osmotic gradient between soil and xylem vessels can also force water up xylem | 1 |
| * Water reaches Spongy mesophyll in leaves | 1 |
| * Water present in the spaces between mesophyll cells evaporates | 1 |
| * Water vapour leaves through open stomata | 1 |
| * Water from the mesophyll cells replaces evaporated water | 1 |
| * Water continues to be drawn through xylem to replace evaporated water | 1 |
| **TOTAL** | **10** |

**Question 39 (20 marks)**

(a) Both prokaryotic and eukaryotic cells possess plasma membranes.

(i) Describe the differences between the location of plasma membranes in prokaryotic and eukaryotic cells.

(ii) Describe the structure of the plasma membrane and the function of each of the components.

(10 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **Part (i)** |  |
| * Eukaryotes are organisms whose cells have a nucleus and other organelles enclosed by plasma membranes. They have a plasma membrane/cell membrane | 1 |
| * Prokaryotes are unicellular organisms that have a cell membrane but lack membrane-bound structures/organelles | 1 |
| **Part (ii)** |  |
| * The plasma membrane is formed from a phospholipid bilayer | 1 |
| * the phospholipid bilayer is fluid and individual phospholipids can move freely within the mosaic | 1 |
| * Phospholipid heads are hydrophilic while the tails are hydrophobic | 1 |
| **Any five of the following points:** |  |
| * The phospholipids allow passage of hydrophobic/nonpolar substances across the bilayer | 1 |
| * proteins occur throughout membrane | 1 |
| * Proteins may be carriers for specific molecules | 1 |
| * channel proteins allow passage of polar/water-soluble substances | 1 |
| * Cholesterol occurs within the plasma membrane |  |
| * Cholesterol within the plasma membrane creates stability in the plasma membrane | 1 |
| * Glycoproteins are attached to the outside of the plasma membrane | 1 |
| * Glycoproteins serve to communicate/detect other cells | 1 |
| **TOTAL** | **10** |

(b) Explain, using well described examples, how the bodies of multicellular organisms are structured in a hierarchical fashion. (10 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| States hierarchy: cells🡪 tissues🡪organs🡪systems | 1 |
| Defines cells as the smallest structural and functional units of an organism | 1 |
| Gives an example of a cell e.g. erythrocyte and describes its function | 1 |
| Defines tissues as a group of structurally and functionally similar cells and their intercellular material | 1 |
| Gives an example of a tissue e.g. blood and describes its function | 1 |
| Defines organs as a collection of tissues that structurally form a functional unit specialized to perform a particular function | 1 |
| Gives an example of an organ e.g. heart and describes its function | 1 |
| Defines systems as a group of organs that work together to perform a certain function in an organism's body | 1 |
| Gives an example of systems e.g. cardiovascular system and describes its function | 1 |
| States that the group of systems form the organism | 1 |
| **TOTAL** | **10** |

**End of Exam**