**

**‘A’ LEVEL GUIDE**

**Biology**

**Paper 2**

***SECTION A (40 MARKS)***

1. *(i) Ingestion of glucose caused the glucose levels to increase; in the blood up*

*to a peak; and then glucose levels decreased; continuously; 4 x 1 marks@*

*(ii) Ingestion of glucose caused the blood glucose levels to increase; to a peak; the glucose levels then decreased; and levelled off; remained constat*

1. *(i) Describe the differences in the glucose levels of diabetic and normal*

*individuals. (04marks)*

*Differences in the glucose levels of diabatic and normal individual.*

* *Normal glucose levels reach their peak earlier than for a diabetic;*
* *The peak of glucose level for normal individual is lower than for diabatic;*
* *After the peak; diabatic glucose level fall continuously while those of normal fall and then level off;*
* *Diabetic glucose concentrations show at first a rapid followed by slow increase while those for normal show gradual increase only;*

*4 x 1 mark @*

*(ii) Explain the observed differences in the levels of glucose of the two*

*Individuals. (06marks)*

*The diabetic individual has a faulty pancreas which is in excess; so the islets of langerhans / beta cells cannot secrete insulin hormone; so that the absorbed glucose is not being removed; or regulated.*

*The normal individual has a functional pancreas / islets of Langerhans / beta cells; so they secrete enough insulin hormone; that romoves the excess glucose absorbed; and the glucose level becomes restored to its norm / set point;*

*Any 6 x 1 mark @*

1. *Suggest and explain how the results of the experiment in figure* ***1*** *would be affected if the:*
2. *Normal individual had ingested a starch solution instead of glucose solution.*

*(05marks)*

*Ingestion of starch would show a similar response as that for glucose; but raise in glucose levels of blood would not occur immediately; the results would be similar because the starch would be digested; to produce glucose;*

*The raise in glucose levels would not occur immediately because starch being a large molecular carbohydrate; would take longer to be digested into glucose;*

*Any 5 x 1 mark @*

1. *Diabetic individual was injected with insulin hormone before ingestion of the glucose solution. (03marks)*

* *Glucose levels would show minimum deviation; if the individual is of type I diabetes; / onset juvenile diabetes / insulin - dependent diabetes. Therefore insulin would regulate the sugar levels. Owtte 3 x 1 mark @*

*Alternatively*

*Glucose levels would show a similar response as before; if the individual is a type II diabetes / late onset diabetes or insulin – independent diabetes; where the target cells for insulin hormone have lost their response to insulin 3 x 1 mark @*

1. *(i) Describe the relationship between the concentration of glucoseand insulin in*

*table****1****. (03marks)*

*Initially, as the glucose level raises, the concentration of insulin remains constant;*

*as the glucose level continues to rise, the levels of insulin also rise;*

*as the glucose levels fall, the levels of insulin fall later;*

*3 x 1 mark @*

*(ii) Explain the relationship described in (d) (i) above. (04marks)*

*Initially the absorbed glucose had not exceded the norm, so insulin levels remained constant;*

*The raise in glucose levels above the set point; induced the pancreas to secrete insulin hormone whose level rose; in order to lower the glucose levels back to the norm;*

*The fall in glucose levels suppress the secretion of insulin by the beta cells / pancreas; whose level also falls later on;*

*Max 5 x 1 mark @*

1. *From the results in table* ***I*** *above****,*** *explain the likely healthy condition of the individual. (04marks)*

*The individual is normal; because raise in glucose levels is followed by raise in insulin levels; which lowers the glucose levels back to the normal; 3 x 1 mark @*

*Total 40 marks*

***SECTION B (60MARKS)***

*Attempt any* ***THREE*** *questions.*

1. *(a) Explain how the following tissues are adapted for their function.*
2. *Xylem vessels. (08marks)*

* *Long cells joined end to end; to allow flow of water in the continuous column;*
* *Narrowness of the lumina or lumen; to increase on capillarity forces;*
* *Lignified walls; to prevent them collapsing under tension;*
* *Presence of pits in the walls; permit lateral flow of water;*
* *End walls of vessles are broken down; during development to give un interrupted flow of water; (from roots to leaves)*
* *Impregnation of cellulose walls with ligm; increases adhesion of water molecules promoting increased capillarity;*
* *No living contents; so little resistance to flow of water; / accept empty lumen*

*8 x 1 mark @*

1. *Compact bone. (06marks)*

* *Presence of osteoblasts; stellate that divide and lay down a new matrix;*
* *Presence of osteoclasts; that reabsorb bone matrix; and reduce on the bone size;*
* *Presence of canabiculi; that connect osteocytes / inactive bone cells to each other and to the haversian canal;*
* *The canaliculi transports materials to and from blood vessesl in the canal;*
* *The Volkmann cannals; provide a passage for nerves and vessles to be carried from bone surface down haversian systems.*
* *Blood vessels for nourishment of the bone cells;*
* *Nerves coordinate activities of bone cells*
* *Periosteum contains bundles of collagen fibres that pierce the bone providing an intmate connection between under lying bone adn periosteum and act as a firm base for tendon insertions*
* *Lamellae laid down in layers forming an irregular cylinder; to resist compression and tension.*
* *Presence of organic and inorganic salts in the matrix; for providing strength;*

*6 x ½ mark@*

*(b) How is support achieved in herbaceous plants? (06marks)*

*Herbaceous plants absorb water by osmosis; and become turgid; and maintain erect position.*

*Have schrenchyma; and collenchyma tissues; whose walls are thickened with rigum; and cellulose respectively;*

*Also tendrils may be present for support;*

*Accept presence of little ligrin in the vascular bundles may provide additional support*

*6 x 1 mark @*

1. *(a) Describe the structure and formation of nucleic acids. (10marks)*

*Nucleic acids are long chained molecules consisting of repeated complex molecules called nucleotides; each nucleotide then consists of a sugar ring; attached onto phosphoric acid; and an organic nitrogenous base; 5 x 1 mark @*

*Formation of nucleic acids;*

*A pentose sugar unites with a phosphoric acid molecule; and a n organic base; in a condensation reaction; to form a nucleotide; the nucleotide then joins through their phosphate groups; being linked by phosphodiester bonds; to form a polynucleotide chain or nucleic acid; 5 x 1 mark @*

*(b) How is DNA involved in the synthesis of proteins in cells? (06marks)*

*DNA unwinds; and a complentary mRNA is formed from one of the DNA strand and this acts as a template;*

*The sequence of bases on mRANA is used to determine the sequence of amino acids that form a polypeptide; during translation;*

*Thus the sequence of amino acids in a protein synthesized depends on the sequence of bases on mRNA; which is also syntehsised in accodiance to the sequence of bases of DNA molecule;*

*6 x 1 mark @*

*(c) Explain the effect of temperature on the denaturation of enzymes.*

*(04marks)*

*Temperatures above the optimum; cause the hydrogen bonds and other bonds that maintain the globular or tertiary structure of eh enzyme to break; this leads to loss of the tertiary structure of the enzyme and thus the structure of the active sites;*

*4 x 1 mark @ . Accept only logical sequence of facts.*

1. *(a) Differentiate between the circulatory system of fish and mammals.*

*05marks)*

|  |  |
| --- | --- |
| *Fish* | *Mammals* |
| * *Single circulation* * *Blood flows under low pressure* * *Oxygenation of blood occurs in gill lamellae* * *Circulation is slow or sluggish* * *Heart has only one atriuman ventricle* * *Valves are absent* * *Pumps only deoxygenated blood* * *Blood passes through two capillary systems before returning to the heart* * *Blood meets more resistance during circulation* * *Blood does not return to the heart after picking* | * *Double circulation;* * *Blood flows under high pressure;* * *Oxygenation of blood occurs in lung capillaries;* * *Circulation is more rapid or fast* * *Heart has two atria and ventricales;* * *Valves are present;* * *Heart pumps oxygenated and deoxygenated blood;* * *Blood passes through in one capillary system before returning to heart* * *Blood meets less resistance during circulation;* * *Blood returns to the heart after picking up water from lungs.* |

*Any 5 x 1 mark @*

*(b) Outline the events that lead to ventricular systole in mammals. (06marks)*

*Electrical excitations or waves of excitation are initiated by the sino atrial node; that functions as the pace maker;*

*The waves of excitation spread across both the atria; causing them to contract at the same time; simultaneously; and these eventually reached the atria ventricular node; from here the waves are passed on to the purkrinje tissue via the bundle of his; the purkinje tissue spreads them to the ventricle; causing them to contract or inducing systole;*

*Max 6 x 1 mark @*

*(c) Explain each of the following observations:*

1. *Endothermy requires a double circulatory system. (04marks)*

*Endotherms have high metabolic rate; to maintain a constant body temperature; and a double circulation ensures s more rapid circulation; to supply metabolites quickly or faster; in order to sustain a high level of metabolism;*

*Any 4 x 1 mark @*

1. *Single circulation is not suitable for fresh water fish. (05marks)*

*Fresh water fishes are faced with a problem of osmotic entry of water into their tissues; and this can lead to dilution of their body fluids; so they need a high glomerular filtration rate to off set the excess water absorbed; and this requires a high blood pressure; which cannot be availed with single circulation; therefore they have adaptively developed many large glomeruli to overcome this challenge;*

*Any 5 x 1 mark @*

1. *(a) Explain the ecological impact of each of the following human activities.*
2. *Use of pesticides. (07marks)*

*Are used to remove unwanted organisms like pests and vectors of human diseases; pesticides are often not specific and may kill beneficial organisms; thus disrupting food webs;*

*They can be concentrated along food chain; and kill oganisms at the top of the chain; may affect animal products e.g. shells of eggs in birds;*

*Pesticides may be slow to break down; and consequently may have long term effects in the environment;*

*Over use of pesticides may lead to development of resistance in the pests or pest resurgence.*

*7 x 1 mark@.*

1. *Drainage of nitrate into water bodies. (06marks)*

*Water bodies become enriched with nutrients; accelerating growth of algae or aquatic plants leading to algae blooms; when the algae die; aerobic bacteria begin demcomposing them down; while using up oxygen; thus oxygen becomes depleted; with time and this leads to death of other aerobic organisms;*

*6 x 1 mark each*

*Accept oxygen depletion leads to;*

* *Increase in number of anaerobes*
* *Reduced metabolism or productivity*
* *Disruption of breeding in migratory species*
* *Increased anaerobiosis hence accumulation of water*

*(b) How can endangered species be conserved? (07marks)*

* *Restrict trade in endangered species;*
* *Protect, and restore habitats;*
* *Transfer endangered species from threatened to safer areas;*
* *Reduce on hunting or poaching;*
* *Establish sperm banks; and seed stores*
* *Establish same parks or narional parks or game reserves or protected areas*
* *Enact or put strict laws against human activities that endanger wild life*
* *Reduce on teh use of bio – poisons or pesticides*
* *Sensitising of people or public about importance of wild life.*

*7 x 1 mark @*

1. *(a) How is the loss of uterine lining prevented after conception in humans?*

*After fertilization, the zygote developes into the blastocyst; whose outer cells begin to secrete human chorionicgona dotrophin hormone; (HCG) that prolongs the life of corpus luteum;*

*The corpus luteum continues to secrete progesterone; and oestrogen; hormones. These bring about increased growth of the endometrium; and this prevents the loss of living of the endometrium or uterine wall;*

*(b) Explain the role of the placenta as a barrier and link between the foetus and the mother. (08marks)*

*The placenta prevents mixing of th fetal and maternal blood; so that the fetus is not exposed to the relatively high blood pressure of maternal blood or circulation; and there is no possibility of agglutimation in the fedal circulation; since the bloods of the two may not be compatible / be of differen ABO blood groups;*

*Placenta also prevents passage of pathogens; and maternal hormones into the fetal circulation, as these could adversely affect fetal development;*

***Role of placenta as link;***

*Allows antibodies to pas from maternal into fetal circulation; and provide the fetus with (passive) immunity; Allows nitrogenous wastes and carbondioxide from the fetus to pass into maternal circulation;*

*Allows the passage of nutrients or oxygen or water or soluble foods or vitamins or salts; from maternal to fetal circulation for metabolism; of the fetus*

*(c) Describe the significance of developmental changes undergone by the*

*mammalian foetus during pregnancy. (08marks)*

***reject part (c)***

***END***