**MARKING SCHEME BIOLOGY \_SENIOR FOUR**

1. Characteristics of fungi

– Eucaryotes

- No chlorophll

- Rigid cell wall

- Reproduction by spores

- Non-mobile

- Body mycelium

 **Any four (4 marks)**

 2 a) Consist of double membrane with the inner membrane folded to form cristae

 **(2 marks)**

b) sites of Krebs cycle, oxidative phosphorylation takes place. **(2 marks)**

3) Cell surface membrane engulfs/flows around food particles, vesicles pinched off and

 membrane reform. **(2 marks)**

4) Because it attacks the very body system that defends the body from infectious diseases. By knocking out the immune system, it leaves the body vulnerable to attack by many microbes that would not normaly be able to infect a healthy body`

5 a) Carrier proteins are proteins that span the membrane; transport molecules from across the membrane; ions bind to specific receptor sites on protein. Protein change shape, release ions on the other side of the membrane. **(2 marks)**

b) Each is specific to the particular molecule/ion that it carries. **(1 mark)**

6 a) Similarities between Maltose and Glucose:

- They are both reducing sugars.

- Reduce copper oxide in Benedict’s solution to copper` **(2 marks)**

 b) Glycose is :

 - easily available,

 - more soluble

 - oxidized directly

7 a) Proteins are required for synthesis of materials for cell replacement and functional proteins such as hormones and enzymes. **(2 marks)**

 b) 60 g of proteins fullfil all his needs. Excess are broken down in the Liver and

 excreted in urine. **(2 marks)**

8) mRNAis a single stranded and so less stable, as nucleotide bases are exposed and not paired. It also contains Uracil instead of Thymine, which may contribute to the lower stability of the molecule. mRNA is involved in protein synthesis. If the cell is to control protein production, the disintegration of mRNA stops too much of certain proteins being made and so allows for regulation of protein level in a cell. **(4 marks)**

9) Differences between Hormones and Enzymes

|  |  |
| --- | --- |
| **Hormones** | **Enzymes** |
| Signal proteins that carry messages around body | Biological catalysts that control biochemical reaction |
| Secreted by endocrine glands | Secreted by exocrine glands |
| Regulatory actions | Metabolic actions only |
| Effects are widespread | Effects are specific |

 **(4 marks)**

10 a) Locomotion is the ability of an organism to move in a particular direction in its environment. **(1 mark)**

b) Animals show locomotion in response to look for food, escape from predators and look for mates. Plants are autotrophs, making their own food and therefore no need for locomotion. **(3 marks)**

11 a) Enzyme activity in the small intestine would be impaired because their enzymes are denatured by low PH. **(2 marks)**

b) Active pepsine would digest cells that produce it. There is no mucus barrier within the zymogen glands. **(2 marks)**

12 a) Ligament: Connect bone to bone in the formation of joint allowing flexibility of movement. **(2 marks)**

b) Tendon: Attaches muscle to bone so that the muscle exerts force on the bone to bring about movement. **(2 marks)**

c) Provide the hard anchorage points upon which muscle can act to bring about movement. **(2 marks)**

13) a) The activity site of the enzyme is complementary to the substrate. The enzyme is not able to convert protein to amino acid for that reason. The two are incompatible.

 **(2 marks)**

 b) The catalyst part of the enzyme is the active site. This has a very specific shape, so only one or a very few molecules are able to fit into the active site. **(2 marks)**

c)Only proteins can produce such a wide variety of shapes. This is because proteins are made from 20 different amino acid sub-units. **(2 marks)**

14 a) Use of living organism/biological agents/animals/plant cells/microorganisms to produce useful products. **(2 marks)**

b)–Identical to human insulin/rapid response

 -No rejection problem/side effect

 - Less risk of transmitting disease

 - Good for people who have developed tolerance to animal insulin.

 **Any two: 2 marks**

15 a) Tropical climate provide the best breeding and living condition for the Anopheles mosquito which transmit malaria.Plasmodium needs in excess of 20o C for it to complete its lifecycle within the mosquito, which temperature is available in the tropics. **(2 marks)**

b) Plasmodium has the ability to change the proteins that make up its surface antigen because it is a eukaryotic organism and therefore has many genes that can code for a variety of surface antigens. It divides by meiosis which increases variety and it has haploid stages that allow recessive alleles to be expressed. This constant changing of antigens is the main reason why vaccine is difficult to develop. **(4 marks)**

16) Viruses don’t have common characteristics of living organisms on their own. For example, when not invading a cell. It can not grow, or reproduce, does not feed, respond or excrete. The only living characteristics it shows is the ability to reproduce only when inside a living cell using materials supplied by the cell. **(4 marks)**

|  |  |
| --- | --- |
| **Feature** | **Type of cell division** |
| **Meiosis** | **Mitosis** |
| **1** | **√** | **√** |
| **2** | **√** |  |
| **3** |  | **√** |
| **4** | **√** |  |
| **5** | **√** |  |
| **6** | **√** | **√** |

 **(features 2-6), 1 was done (5 marks)**

**SECTION B**

18**)** –Define Mitosis

 - Mention the four stages and interphase

 - Interphase

 - Prophase

 - Metaphase

 - Anaphase

 - Telophase

Mention events/behaviours of chromosomes at each stage **(10 marks)**

19) Differences between DNA and RNA

|  |  |
| --- | --- |
| **DNA** | **RNA** |
| Occurs inside the nucleus | Most of it is in the cytoplasm |
| Double stranded | Single stranded |
| Contains Millions of nucleotides | Contains 70-12000 nucleotides |
| Purines and pyrimidines are equal in number | No proportion between Purines and pyrimidines |
| Replicates itself | Can not replicate itself |
| Contains genetic information | Directs protein synthesis |
| Long lived | Short lived |
| Has Thymidine base | Has Uracil base |
| It is one type | There are three types |
| Transcribes genetic information to RNA | Translates the message to form polypeptides |

 **(10 marks)**

20) Biological functions of water

* to plants:

-Osmosis and turgidity

-Reagent in photosynthesis

-Germination of seeds

-Transpiration and Translocation

-Mineral absorption

-Fruit and seed dispersal

* to animals
* Transport
* Osmoregulation
* Cooling and evaporation
* Support
* Protection
* Habitat **(10 marks)**

21) -Definition of sexual reproduction & asexual reproduction

 **Advantages: Asexual**

-Maintains good strains exactly

-Only one parent is required

-More rapid to colonise an area

**Disadvantages: Asexual**

-Species liable to be wiped out

-No resistance among species

**Advantages Sexual**

-Produces new varieties

-Enable survival of species

**Advantages Sexual**

- Produces new varieties

- Enable survival of species

**Disadvantages sexual**

-Both parents are required

-Can not give identical offspring

- Slow multiplication

-both may produce once and then die

 **(10 marks)**

22 a) Enzymes are catalysts in biochemical reaction and are proteins in nature.

 b) All enzymes are very similar in many ways

 -They are globular proteins

 - They act as catalysts

 - They are not used up as part of the reaction

 - They are specific

 - Their activity is affected by temperature and PH

 -They may require cofactor in order to function properly. **(6 marks)**

 c) Enzymes are proteins in nature while catalysts are inorganic in nature.

 **(2 marks)**