

**NATIONAL EXAMINATION 2005**  
**SUBJECT: BIOLOGY I**  
**SECTION A**

**ANSWER 001.**

- a) The DNA replication take place in a eukaryotic cell in:  
**the nucleus or mitochondria or chloroplasts.**
- b) Other types of molecules, apart from nucleotides which are needed necessary for DNA replication to take place are: enzymes or DNA polymerase or helicase and ligase.

**ANSWER 002.**

Pestudo ehippium is one of the species of a large tortoise. We complete the following table as follows to show its classification :

KINGDOM	ANIMALIA
Phylum	Chordata
Class	Reptilia
Order	Chelonia
Family	Testudinidae
Genus	Testudo
Species	ehippium

**ANSWER 003.**

The diagram below shows the structure of a cell surface membrane : lipid or phospholipid or pole or hydrophilic polar head. prosthetic group or carbohydrate.

Glycoprotein.

The properties of phospholipids are important in the formation of membranes.

## ANSWER 004.

a) The cells in the pancreas produce enzymes. These cells are associated with large amounts of rough endoplasmic reticulum and Golgi bodies because: it is an adaptation to the secretory cells, in effect, ribosomes synthesize proteins. The proteins are injected into endoplasmic reticulum that leads to the Golgi body where they undergo maturation or sorting, storage, packing, export.

b) For each  $10^{\circ}\text{C}$ , the temperature, the rate of reaction catalyzed by enzymes to double the optimum temperature.

## ANSWER 005.

(A) Large organizations need a circulatory system to transport materials or nutrients, gases, metabolic wastes because they have a large number of cells among the organs thick.

- Regulation

Breathing

Nutrition

Communication

Exchange

(B) the double circulation in mammals means that:

2 times the blood passes into the circulatory during a cycle.

In mammals, there is great circulation and a small circulation.

## ANSWER 006

The diagram shows an inverted pyramid of biomass.

One reason for this reversal:

- Plankton animals weighing more than plankton plants.

- Or plant plankton are consumed by plankton animals.

- Or plankton animals are not consumers.

- Plant plankton or reproduce much faster.

### ANSWER 007.

Down syndrome can be caused by the non-disjunction. The non-disjunction means non separation or segregation of homologous chromosomes. The non-disjunction causes Down syndrome: the pair of homologous for chromosome 21 are passed through a nucleus of the cell or gamete. At the time of fertilization, the zygote will end up with 3 on chromosome pair 21.

### ANSWER 008.

Two groups of enzymes digest proteins: the endopeptidases and exopeptidases.

What are the endopeptidases:

- break peptide bonds of amino acids in the middle of a long chain
- Transforming the long polypeptide chain into short peptides.

What do exopeptidases:

- they cleave peptide bonds found at the end of a polypeptide chain.
- or they transform amino acids into polypeptides.

The group which is secreted first is endopeptidase because they reduce long polypeptide chain into short chains.

These enzymes break down proteins into polypeptides and amino acids.

### ANSWER 009.

The factors that make malaria a disease difficult to control are:

- High number of vectors or Anopheles.
- Favorable weather conditions for the multiplication of vectors (high temperature or warm).
- Lack of means of prevention (mosquito net, mesh, produced as preventive drugs and vaccines)
- Resistance of the vector.
- Resistance of the microbe.
- Poor sanitation.
- Non-disease survival (non-respect of dose)

+Lack of information about the disease .

+Poverty (lack of means for treatment, non-accessible, lack of health infrastructure).

+Complex life cycle (the signs occur late, long incubation period)

b) There is high risk of cholera in refugee camps because:

- isolation of patients difficult.
- overcrowding or concentration of people in a small space or overcrowding.
- lack of drinking water.
- alt unhealthy lack of toilets, lots of rubbish, garbage, breach of hygiene, dirty food ).

A lack of health interventions (drugs insufficient, insufficient nurses, doctors insufficient).

### ANSWER 010.

The table below show the core temperature of 2 animals at various times on a hot sunny day. Animal A was allowed to drink water but animal B was deprived of water.

Time of day	Core temperature / c	
	Animal A	Animal B
9.00	36.0	34.8
12.00	37.7	38.6
15.00	39.2	40.1
24.00	35.8	37

) The temperature of the body of the animal does not rise as high as that of the animal B because:

Water plays the role of thermostat or temperature regulator or temperature stabilizes, the specific heat is high.

Water temperature is opposed to rise (cools the body, realized the thermolysis).

b) The temperature of the animal's body B is controlled as follows: hiding in the shadows or run away.

> Sweating or panting mouth or he'll open his mouth.

### ANSWER 011.

The diagram shows the main stages of aerobic respiration:

a)

A: cytoplasm, cytosol or hyaloplasm.

B: mitochondrial matrix.

C: mitochondrial membrane or mitochondrial peak.

b) The substance X is called  $\text{CO}_2$  or carbon dioxide or coenzyme A

c) 38 molecules of ATP are produced in total during the complete decomposition of a molecule of glucose. The number of A. T.P.

Formed:

A: 2 ATP

B: 2 ATP

C: 34 ATP

### ANSWER 012

Flowering plants reproduce both sexually than asexually.

the benefits, it has such plants are:

- colonizes an area very quickly.
- rapid reproduction (high numbers of individuals or offspring)
- preserve the species or life of the species.
- provide the same consistency or variability of the offspring.
- The seeds can be stored in adverse conditions (eg weather).
- intervention of a single parent or have an offspring from a single parent.

## ANSWER 013.

you have a solution and you know it contains sugar, but you do not know if it is a reducing sugar, a non-reducing sugar or a mixture of both. You can specify what it is to as follows:

+ To the reducing sugar, mixing a sample of the Fehling's solution and heated. If you observe the red brick precipitate, this implies the presence of a reducing sugar.

+ For a non-reducing sugar (starch), mixing a sample of the solution with water iodine (Lugol's solution = suitable).

If one finds the appearance of a dark blue color (dark blue), this implies the presence of a non-reducing sugar (starch)

<• for mixing every 2, the test Fehling's test and use water iodine (the 2 tests are all positive (appearance of a blue color and a reddish brick.

## SECTION B

### ANSWER 014.

The diagram representing two neighbouring plant cells .

(a) The direction is the net movement of water molecules: from A to B

(b) The net movement means the movement or transfer of a substance from one place to another.

(c) What would happen if the two cells were placed in pure water ?

i) For cell A: There are water inlet Inside or swelling (turgor) of the cell.

ii) For the B cell: There are also water inlet Inside or swelling of the cell.

## ANSWER 015

Names of the following structures in the synapse:

- a) i) A: mitochondria
- ii) B: a synaptic vesicle
- iii) the contents of the structure B: neurotransmitter, a chemical mediator.

b) The arrival of a pulse changes the permeability of the presynaptic membrane, allowing calcium ions to diffuse as indicated by arrows on the diagram. The effect is caused by the influx:

- The synaptic vesicles to fuse with the membrane or synaptic vesicle movement.
- the release of neurotransmitters in the synaptic cleft
- The structure A is abundant in the presynaptic region because:
  - to produce the energy required to absorb ions.
  - A production of acetylcoenzyme A, which merges with choline to form acetylcholine.

## ANSWER 016.

a) The true total of AIDS cases worldwide may be much higher than that reported because:

- Many people are afraid to do the testing.
- defective (poorly done early).
- lack of testing equipment.

b) The condoms are not completely effective HIV prevention has because:

- They can tear during intercourse
- other bad qualities are letting the virus.
- They may be misused (misused, falls into the reproductive system).

c) advice we can offer as a participant in the program of AIDS education:

- refrain from casual sex.
- -do a test.
- not conceive when the woman is already HIV positive.
- condom use.
- + Not discredit infected person or prevent the marginalization or avoid stigma, love.
- + Ask the infected person eat well.
- + Be circumcised.
- + Prevent a mother with HIV to breastfeed her child.
- + Test blood before transfusion Ia.
- + Create occupations.

### ANSWER 017.

a) **Mutation:** sudden change in character and which is hereditary (genetic change, change of gene, materials, genetics, DNA).

(b) **The different types of mutations are:**

- A spontaneous mutation or natural: is random mutation .
- Mutation caused or induced or artificial is the base of a mutagen agent.
- (Other possibilities:
- Chromosomal mutation is realized at the chromosomal level (affects the number or structure): deletions, translocation, duplication, inversion.)
- Gene mutation or point: it affects the structure and position of a gene (deletion, translocation, inversion, substitution, duplication ...)

(c) The genotype of individuals designated A to E in the figure below:

Key:

- normal female ●
- color blind female ◊
- Male normal □
- ◻ color blind male ◻

A = XY

B = X<sup>d</sup>X

C = X<sup>d</sup>X

E = X<sup>d</sup>Y

### ANSWER 018.

(a) Active transport and osmosis are two main ways by which substances move in and out of cells.

Differences between these two processes are:

Active transport	Osmosis
Require energy	Does not require energy
Require carriers (Mediators, enzymes)	Does not require carriers
Exchange of charged or uncharged substances	water exchange
Exchange is done according to concentration gradient or against concentration gradient	Exchange is done always according to concentration gradient ( from hypotonic local to hypertonic)

(b) The part played by active transport and osmosis in each of the following:

i) The uptake of substance from the soil by roots:

-Osmosis allows the entry of water into root .

-Active transport allows the passage of dissolved substances or ions from the soil to the root.

ii) Selective reabsorption in the proximal convoluted tubule of a nephron:

- osmosis allows water to return blood flow in (recovery or reabsorption of water).

-Active transport can return to the movement of certain molecules that are still useful (glucose, mineral salts, chlorides).

## SECTION C

### ANSWER 019

The diagram below shows the flow of energy through the organisms at different feeding levels in a habitat.

a) Percentage of solar energy falling on the habitat and is trapped by the producers

$$\frac{25.000 \times 100}{2.500.000} = 1\%$$

b) the energy values A =  $120 - 96 / \text{unit} = 24 \text{unit}$

$$= 3.1000 - 15.900 \text{unit}$$

$$= - 12.900 \text{unit}$$

Or the energy values at B =  $(180 + 120 + 300) \text{unit}$

$$= 600 \text{units}$$

c) In this habitat, the primary consumers are small invertebrates such as snails, earthworms and insects. The 3rd consumers are foxes and hawks.

i) The proportion of total energy consumption used in respiration

By the first consumers =  $\frac{900 \times 100}{3.000} = 30\%$

$$3.000$$

By 3rd consumers =  $\frac{96 \times 100}{120} = 80\%$

$$120$$

Consumers who use the greatest proportion Energy are the 3rd consumers .

ii) What explains the difference in the calculated proportions:

-For consumers, the low metabolic activity or diet variable thermal or poikilothermic! active moms.  
For the 3rd-consumers, the high metabolic activity or diet thermal constant or homeothermic / very active.

iii) There are only 5 feeding levels in this habitat.

He can not have a sixth feeding level because:

-Decomposers are very small to be consumed.

3rd-the consumers provide an amount

Very low power of ensuring survival o another level trophic.

-Decomposers often mark the end of a chain.

### ANSWER 020.

a) **In the nucleus** of a human cell, there are 46 chromosomes.

b) Humans reproduce by sexual reproduction. Reasons why the human body does not grow up to look exactly like either of their parents:

-Random distribution of chromosomes in sex cells.

-Random fertilization of gametes.

Crossing-over or mixing intra-chromosomal.

-Co-dominance of alleles.

-Mutations (phenotype: influence of the environment)

-The offspring inherits the chromosomes of two parents (this is not a clone).

The recessive alleles, or heterozygosity.

c) i) a person's sex is determined by sex chromosomes. It is impossible for identical twins to be a girl and a boy because:

They come from the union of one spermatozoid (X or Y) and an egg X.

-Or they come from a single zygote.

Us-or even have sex chromosome.

- Or they have the same genes.

-Or come from a single fertilized egg.

ii) Cloning is an artificial process to produce offspring that are genetically identical to their parents. Potential problems of reproducing animals by this method are:

Very complex process, very expensive (need complex materials: an electron microscope, laser beam, difficult to collect the core charge)

Highly-qualified persons.

-Sometimes the cloned cells do not produce the desired results.