| مسابقة في مادة الثقافة العلمية (كيمياء) | الاسم: |
| المدة: ساعة واحدة | الرقم: |

This Exam Includes Two Exercises. It Is Inscribed on Two Pages Numbered 1and 2. The Use of A Non- programmable Calculator is Allowed.

Answer The Two Following Exercises:
First Exercise (10 points)
Proteins

Proteins are made of chains of α-amino acids of various lengths, forms, compositions and functions. They are the principal structural and functional components of cells of our body: enzymes, molecules for the transport of blood and molecules of the cellular membranes, the hair, the nails …

There are a certain number of factors which determine if the α-amino acids will be used for the synthesis of new proteins or will be burned to provide energy.

All the α-amino acids needed to elaborate certain protein must be present in sufficient quantities in the same cell. Since the essential α-amino acids cannot be stored, those which don't enter immediately in the synthesis are either oxidized for the production of energy, or converted into carbohydrates or lipids.

The quality and the nutritional value of a protein depend on the content of essential α-amino acids and the speed of its digestion.

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Given:
-   It is suggested to take daily 0.8 g (proteins) /kg of ideal body weight.
-   1 g of proteins gives 4 kcal.

Questions

1- Write the general formula of an α-amino acid.
2- Define an essential α-amino acid.
3- Name the bond that joins two α-amino acids in a protein.
4- By referring to the text, answer the following questions:
   4.1- Extract the two roles of the α-amino acids in the human body.
   4.2- Indicate the factors that affect the quality and the nutritional value of a protein.
5- The digestion of food proteins could be represented by the following schema:
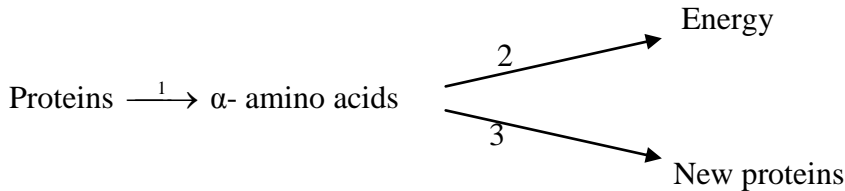
   Choose, among the following terms: oxidation, condensation and hydrolysis, the appropriate one for each of the reactions: 1, 2 and 3.
6- Match the items of the column I to those of the column II:

Column I	Column II
a- Transport protein	i- Antibodies
b- Nutritive protein	ii- Hemoglobin
c- Regulatory protein	iii- Albumin
d- Proteins of defense	iv- Insulin

7- Determine the energy value provided, daily, by proteins for a person having an ideal weight of 70 kg.

Second Exercise (10 points)
Antibiotics

According to the Health Word Organization, the antibiotics become soon inefficient, certain antibiotics actually available will become inefficient from now to10 or 20 years. Bacteria have learn how to defend itself against our favourite medicinal drugs, and we are not sure to win the battle. Are we at the eve of the return of a great epidemic? …

The antibiotics could be divided according to their action spectrum and the broader of this spectrum. Penicillins of a narrow action spectrum destroy gram-positive bacteria (the wall of which is composed of thick layer of peptidoglycanes) and the aminosides, of a narrow action spectrum, attack the gram-negative bacteria (the wall of which is thin). Contrary, the tetracycline and the chloramphenicols are substances of large spectrum, efficient at the same time against the gram-positive bacteria and against the gram-negatives.

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Fusidic acid

Fusidic acid is the fermentation by product of fungi of mushroom *Fusidium coccineum* (a mushroom Deuteromycete) and proved active toward the staphylococci …

It has been proved that fusidic acid has bacteriostatic* role at low doses and bactericidal role at highly doses…

The selection of resistant stamps during the treatment is almost always observed, which prevents using this medicinal drug in monotherapy. Its spectrum activity covers the gram-positive only, especially *Staphylococcus aurous*, and their indications, in association with an aminoside or a β -lactamine, result from the treatment of infections by staphylococci multi- resistant.

* Bacteriostatic: stops the development of bacteria.

Questions:

1- Antibiotic is one of the most current medicinal drug.
    1.1-   Define an antibiotic.
    1.2-   List two other classes of current medicinal drugs and give the role of each class.
2- Indicate the two ways that permit to obtain an antibiotic.
3- Compare a fungicidal and a bactericidal.
4- Referring to the text, answer the following questions:
    4.1- Extract the sentence that illustrates the bacteria resistance.
    4.2- Distinguish between narrow spectrum antibiotic and a broad spectrum antibiotic.
    4.3- Indicate the spectrum of each of the following antibiotics: penicillins, tetracycline and fusidic acid.
    4.4- Give the benefit of the association of an aminoside with fusidic acid.
5- List three advantages of administering a combination of antibiotics.

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First Exercise (10 points)

Part of the Q	Answer	Mark
1	The general formula of an α-amino acid is: R - CH-COOH | NH_2	1
2	An essential α-amino acid cannot be synthesized by the human body. It must be obtained from food.	1
3	This is a peptide bond.	0.5
4.1	The α-amino acid will be used for the synthesis of proteins in the human body or they are burned to provide energy.	1
4.2	The quality and the nutritional value of a protein depend on the essential α-amino acid content and the speed of its digestion.	1
5	Reaction 1: hydrolysis; reaction 2: oxidation and reaction 3: condensation.	1.5
6	a ⟶ ii : b ⟶ iii ; c ⟶ iv ; d ⟶ i.	2
7	The mass of proteins needed daily for this person is: 0.8x70 = 56 g The energy value provided daily = 56x4 = 224 kcal	2

Second Exercise (10 points)

Part of the Q	Answer	Mark
1.1	An antibiotic is a substance used to kill or inhibit the development of micro-organisms.	1
1.2	Anti inflammatory: used to reduce or eliminate inflammation. Anti acid: to treat problems caused by the excess of gastric acid.	1
2	Antibiotic could be obtained by culture or by synthesis.	1
3	Both are antibiotics. Fungicidal used to kill fungi. Bactericidal used to kill bacteria.	1.25
4.1	The sentence is: Bacteria have learned how to defend itself against our favourite medicinal drugs.	1
4.2	A narrow spectrum antibiotic destroys gram-positive bacteria or gram-negative bacteria. A broad spectrum antibiotic destroys gram-positive bacteria and gram-negative bacteria.	1.5
4.3	Penicillins: narrow spectrum; Tetracycline: broad spectrum; and fusidic acid: narrow spectrum.	1.5
4.4	The association of an aminoside with fusidic acid permits the treatment of infections of multi-resistant staphylococci.	1
5	Three advantages: - To prevent the emergence of resistant bacteria. - To limit the side effects. - In case of emergency, when the invading microorganism is unknown.	0.75