First examination 2012-2013 for Biomolecules for Biochemists – 740143P; Biomolecules for Bioscientists – 740147P; Biomolecules – 740148P

Monday 18th February 2013. 12 noon -2 pm

Answers should be given in English, but where necessary Finnish words can be inserted in brackets e.g. discuss the (totta vai tarua) of the following statement.

Section A. Answer **all four** questions from this section. You are advised to spend no more than 40 minutes on this section.

1. What amino acids (alanine, aspartic acid, asparagine, cysteine…etc) would you expect to find in the binding pocket of a protein which binds DNA and why?

2. For the following four sets of molecules, order the three molecules in the set from the largest molecule to the smallest:

   i) Adenosine, adenine, adenosine monophosphate

   ii) Tryptophan, glycine, alanine

   iii) Protein X, the DNA that encodes the mRNA for protein X, the mRNA that encodes for protein X

   iv) Ribose, deoxyribose, glucose

3. Explain with words and/or a drawing what is vesicle fusion, and how and why it happens

4. a) Explain with the help of a molecular formula why a 2-carbon compound cannot be a sugar despite fulfilling the $(CH_2O)_n$ rule.

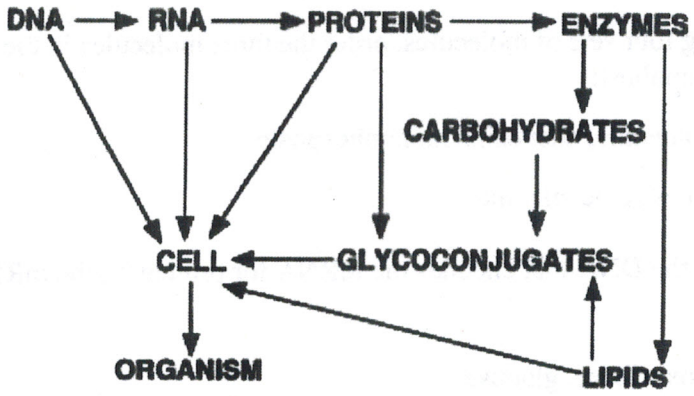
   b) Explain the concept of steric hindrance with respect to sugar molecules with bulky substituents

Section B. Answer **only** 3 questions from this section. You are advised to spend 80 minutes on this section.

1. Discuss the veracity (totta vai tarua) of the following statement: "The rate of evolution for a DNA based organism is directly linked to the strength of hydrogen bonds, if hydrogen bonds were weaker the rate of evolution would be faster"

2. Protein structure depends on a variety of non-covalent forces. Describe these forces and explain how the structure of a protein can change if the environment in which the protein is in alters.

3. Using the attached scheme as a source of ideas please discuss the role of carbohydrates and lipids as <u>structural components</u> of the cell. Include in your answer some examples



4. Explain the following about disaccharides: i) how do they form?; ii) what use do they have?; iii) how are they named?