University of Oulu - Faculty of Biochemistry and Molecular Medicine

Biomolecules for Biochemists – 740143P & *Biomolecules for Bioscientists* – 740147P & *Biomolecules* – 740148P

Examiner: Dr. Tuomo Glumoff, 22.2.2019

Answers can be given in English or Finnish or a mixture thereof - whatever is more convenient.

PLEASE NOTE! There are questions in two sections, A and B.

ANSWER ALL Section A questions.

ANSWER only 3 Section B questions - you have a free choice from 4 questions.

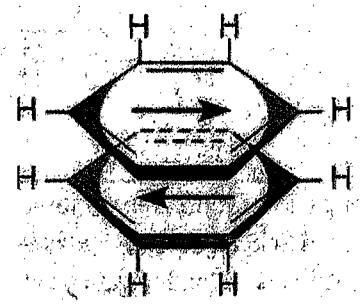
If a question includes the word "discuss", you should provide also some examples. Please note that since section B questions give more points you are advised to reserve answering time for them accordingly.

Section A questions: answer all

Maximum 10 points each

A1. Give a short explanation why these two definitions can both be true:
- Heavy metals, such as cobalt, copper and nickel are essential for human life.
- Heavy metals, such as cobalt, copper and nickel are toxic to humans.

A2. Explain shortly with the help of this figure how dispersion forces help two benzene rings to attract each other, although weakly. Mention also two examples of such forces affecting the structure of biomolecules.



A3. Explain shortly what a protein domain is.

A4. Explain shortly the possibilities for a single membrane lipid to move in the membrane. Comment also the relative speed of each type of movement.

Section B questions: answer 3 out of 4

Maximum 20 points each

B1. Give examples of cellular structures and functions involving carbohydrate molecules. (you need not draw molecules, but present in words; ei ole tarvis piirtää molekyylejä, vaan selvittää sanoin, mutta voi piirtää, jos se on helpompaa).

B2. Prove the following statement right: "Proteins are complex molecules and capable of doing many things in cells". (proteiinit ovat monimutkaisia molekyylejä ja niistä on moneksi soluissa)

B3. Discuss the subject "Metastability in biomolecules".

B4. Explain with molecular/mechanistic examples the various functions associated with biological membranes. Use drawings and/or text. Please do not waste time to explain the basic structure of the biological membrane (it is a lipid bilayer; I know all of you know this for sure...), but think of the various functions and then what molecules in the membrane are responsible for those functions. (selvitä biologisen kalvon tehtäviä - mieti ensin, mitä tehtäviä kalvolla on ja sen jälkeen, mitkä/minkälaiset biomolekyylit mahdollistavat ko. tehtävät ja miten)