UNIVERSITY OF BORÅS

Biotechnology 15 ECTS

Ladokcode: **A113TG**
The exam is given to:

ExamCode: _____

Date of exam: **2017- 06-02**
Time: 09:00-13:00

Means of assistance:
Tillåtna hjälpmedel är lexikon. Dock EJ elektroniskt lexikon
It is possible to use dictionary but not in electrical form

Total amount of point on exam: 116p
Requirements for grading: **U: <57; 3: 57 – 76; 4: 77 – 96; 5: 97 – 116**

Additional information: **You can give your answers either in English or in Swedish**

Next re-exam date:

The marking period is, for the most part, 15 working days, plus up to 5 working days for administration, otherwise it's the following date:

Important! Do not forget to write the ExamCode on each paper you hand in.

Good Luck!

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1 – Describe and explain the structures and the binding forces in a general protein. Draw pictures (one or more depending on the structure) that explain and visualize the structures and the binding forces. Write/draw your answers here in the thesis, not on separate papers.

(a+b+c= 18p)

a) *primary structure*: describe and explain the structure

_____

_____

describe and explain the binding forces

_____

_____

picture/pictures

b) *secondary structure*: describe and explain the structure

_____

_____

_____

describe and explain the binding forces

_____

_____

_____

picture/pictures

Question no 1 continued
c) *tertiary structure*: describe and explain the structure

describe and explain the binding forces

picture/pictures

2 – Membranes consisting of phospholipids can be more or less rigid or fluid. Explain thoroughly what kind of variations in the structure of phospholipids that result in this difference. Also draw pictures to explain.

(6p)

more rigid , explain

_____

_____

_____

_____

picture

more fluid, explain

_____

_____

_____

_____

picture

3 – Give two reasons why cells need to have transport proteins in their cytoplasmic membranes. (4p)

4 – Distinguish magnification from resolution of a microscope. (4p)

5 – What is the main structural difference among cytoplasmic membranes from *Archaea* to that of *Bacteria* and *Eukarya*? How is this structural difference related to more resistant membranes in *Archaea*? (4p)

6 – Draw a scheme of Gram-positive and Gram-negative bacteria cell walls and describe briefly their structural differences. (8p)

a) Name one advantage of using gram-staining as a first screening step in case of infection. (2p)

b) Is lysozyme efficient against *Archaea*? Justify (4p)

7 – Draw a typical growth cycle of a microorganism when cultivated in batch mode and identify and briefly describe the different stages. (10p)

a) Name two reasons because of which a microorganism enters the stationary phase. (4p)

b) What strategy would you use to extend the exponential stage? (2p)

c) Describe a situation where a diauxic growth would be observed. (2p)

d) Distinguish primary metabolites from secondary metabolites. (4p)

e) Distinguish a complex growth medium from a defined growth medium. (4p)

8 – Distinguish catabolism from anabolism and give one example of each. (6p)

a) – Why would a microorganism choose respiration instead of fermentation under aerobic conditions for consumption of glucose present in a given growth medium? (2p)

9 – Give an example of application of heat sterilization and filter sterilization. (4p)

10 – Name the three steps taking place during RNA processing in Eukaryotes. (3p)

11 – What is a mutagenic agent? Give an example of a physical and of a chemical mutagen. (4p)

12 – What are restriction enzymes? Why are they so useful in genetic engineering? (4p)

13 – Name three characteristics of vectors used in genetic engineering. (3p)

14 – What is PCR (Polymerase Chain Reaction)? Describe briefly the different stages of this technique? (8p)

15 – Name a strategy to control if a protein purification protocol is actually working. (2p)

16 – Name two types of chromatography and give one example of application for each. (4p)