Exam ELT-61226 Biomedical engineering: Biomaterials **16.10.2015**

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Dictionaries are NOT allowed. No calculators.

Question 1.

a. What do following terms mean? Explain shortly. (1 p each)
   1. Biomaterial
   2. Hydrolysis
   3. Osteoinduction
   4. Bioabsorbable
   5. Biocompatibility
   6. Implant

b. Based on your knowledge from this course, which kind of material(s) would you use for the development of artificial skin? Which properties are important in the material for this particular application? (4 p)

Question 2.

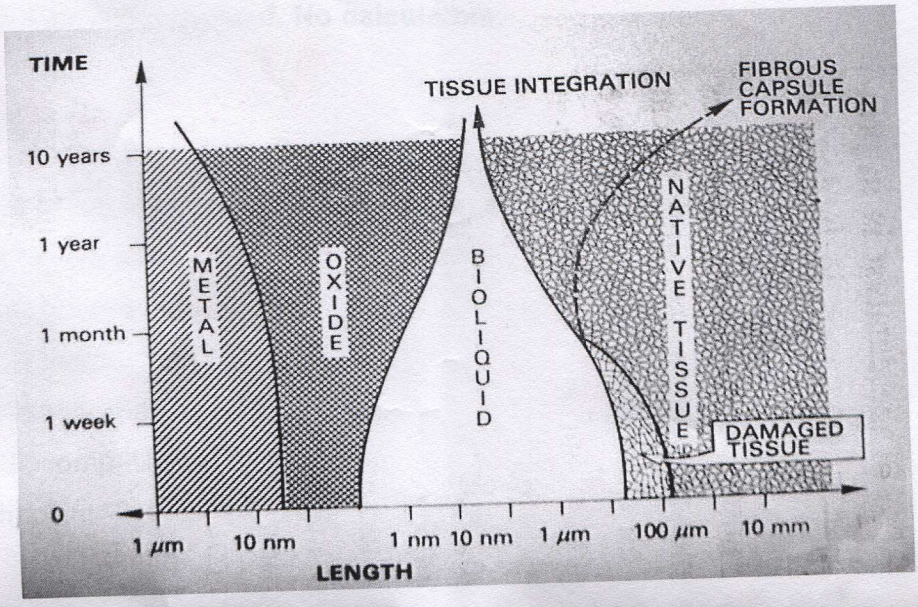
a. Which are the main differences between synthetic bioabsorbable polymers and natural bioabsorbable polymers? Give an example of a material for both of the groups. (4 p)

b. Which are the main degradation mechanisms for these polymer groups? (2 p)

Question 3.

a. Explain shortly the disadvantages that metals have as implantable biomaterials. (5 p)

b. Explain the following graph after 10 years implantation. What has happened and why? What is the role of the oxide layer? (4 p)



Question 4.

a. Living tissue can react in three ways when a foreign material is implanted in it. Explain shortly these three ways. Give also one material example for each case that causes that particular kind of reaction in the tissue. (3 p)

b. What happens in the tissue after implantation? Explain shortly. (4 p)

Question 5.

One of the particularity of ceramics lies in the fact that they can be either nearly inert, bioresorbable or even bioactive. If the application requires bioactivity, what would be the ceramic you would like to use? Describe also the process of bioactivity. (4 p)