Exam ELT-61226 Biomedical engineering: Biomaterials

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NO calculators or dictionaries allowed! Answer in English!

NOTE that there are also questions on the other side of the paper.

Question 1.

a) Explain following terms shortly (1 p each)
   1. Osteoconductive
   2. Bulk erosion
   3. Hydrogel
   4. Cytotoxicity
   5. In vitro
   6. Bioactivity

b) Are following statements true or false? Explain also why. (1 p each)
   1. Normal window glass is suitable for implant applications.
   2. Bioactive glasses are always resorbable.
   3. Calcium phosphates are especially well suited for bone applications.
   4. Pyrolytic carbon is cytotoxic material.
   5. Polycapro lactone is a biostable polymer
   6. Polyvinyl chloride is not suitable for medical applications

Question 2.

Choose one way of classifying biomaterials. Explain it and classify the following materials according to your chosen classification. (6 p)

- Polyglycolide
- Alumina
- β-tricalcium phosphate
- Hydroxyapatite coated cobalt alloy
- Self-reinforced poly(lactide-co-glycolide)
- Collagen
Question 3.
Which are the factors that define the biocompatibility of metals? (6 p)

Question 4.
Living tissue can react in three ways when a foreign material is implanted in it. Explain these three ways. Give also one material example for each case that causes that particular kind of reaction in tissue. (6 p)

Question 5.
Based on your knowledge from this course, which kind of material would you use for the development of muscle tissue replacement that needs to be elastic and bioabsorbable. (4 p)