

Exam BME-1167 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) How can biomaterials be classified? Name four different ways of classification (1p).
Choose one of those you mentioned and explain into which groups materials can be grouped in that particular classification (2p). Give examples of materials belonging to each of those groups (1p).
- b) Define following terms shortly (1/2 p each) :
- Biocompatibility
 - Cytotoxicity
 - *In vitro*
 - Implant

Question 2.

- a) Define the different types of tissue response to the implant. (4 p)
- b) Which material properties influence the behavior of materials in living tissue? Mention four of them and explain them briefly. (2 p)

Question 3.

- a) Explain the disadvantages of using metals in biomedical applications. (4 p)
- b) How does the passive oxide layer function in preventing corrosion of metals in body environment? (2 p)

Question 4.

- c) Are following statements true or false? Explain also shortly why? (2 p, 1/2 p each)
1. Bulk erosion is one way of hydrolytic degradation.
 2. A material can be absolutely inert in living tissue environment.
 3. Bioabsorbable polymers are used in long term applications.
 4. Natural polymers usually have good biocompatibility.
- a) If you had all the biomaterials discussed in this course to choose from, which material would you choose to deliver an antibiotic to an infected muscle? Explain also shortly why. (2 p)
- b) Bioactive glasses can be divided into two groups. Which are they and what is the difference between them? (2 p)

Question 5.

- a) Why are composites used in biomedical applications? (3 p)
- b) How can the properties of a composite be estimated? Is this method reliable? (2 p)
- c) How would you test the mechanical properties of a screw intended for bone fracture fixation? (1 p)