

BIOMEDICAL ENGINEERING: BIOMATERIALS

(CALCULATORS ARE NOT ALLOWED)

Question 1.

- a) Define a negative interaction, a neutral interaction and a positive interaction of the host with an implant (3 p)
- b) Provide 3 examples of materials characteristics that affect host response and biocompatibility (2 p)
- c) Mention 3 examples of environmental factors that affect the biodegradation of a biodegradable polymer (1).

Question 2.

- a) Establish the difference between a homopolymer and a copolymer, a linear polymer and a cross linked polymer and provide an example of a natural polymer and a synthetic biodegradable polymer (3 p).
- b) Mention 3 advantages on the use of polymers in medicine compared to metals and ceramics (2 p)
- c) Provide 3 examples of biostable polymers and how they are used in medicine (1 p).

Question 3.

- a) Name three different metals used as implant materials and explain why and where they are used. (3 p).
- b) Explain two corrosion types (NOT WEAR) and how they affect the oxide layer? (2 p)
- c) What is the "normal" cascade of implant loosening in the case of metals? (1p)

Question 4.

- a) The use of ceramics and glasses in medicine in general, why they are used. Furthermore, name three ceramics and indicate where they are used? (3 p)
- b) What are the calcium phosphate ceramics, how do they interact in aqueous solution? (2 p)
- c) What is meant by bioactivity in the case of bioceramics and glasses? (1 p)

Question 5.

- a) Define a continuous phase and a dispersed phase in a polymeric composite and give one example of each (3 p)
- b) Mention 3 advantages of composites used in medical application (2 p).
- c) Give an example of a commercial composite used in medicine and identify the matrix and the filler on this product (1 p).