BIOMEDICAL ENGINEERING: BIOMATERIALS

Answer ONLY 5 questions out of 6

Question 1.

a) Classification of biomaterials based on the properties (of the material in the body) (3 p)
b) What are the benefits of the bioabsorbable polymer implant over the similar metallic one? (2 p)
c) Considering that you have all the biomaterials discussed in this course to choose from, then choose the one that you could use to repair or replace a damaged cartilage, explain why you chose this material (1 p)

Question 2.

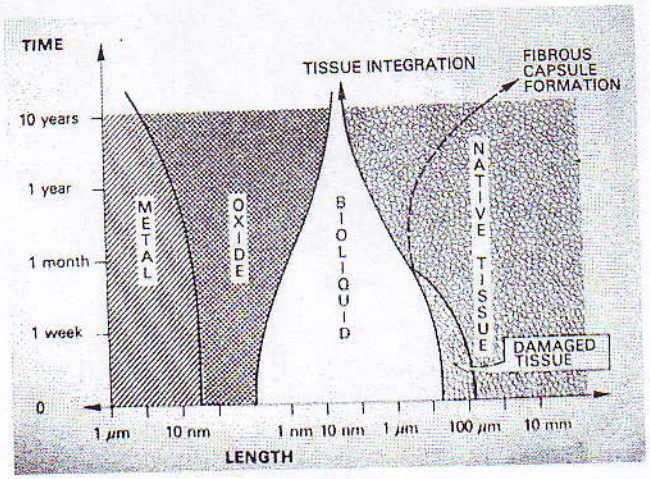
a) Define a toxic material, an inert biomaterial, a bioactive biomaterial. (3 p)
b) Give 3 examples on how the host respond when a biomaterial is placed in the body (2 p)
c) Define biodegradation and what is understood by physical, chemical or biochemical degradation. (1 p)

Question 3.

a) Define a polymer and what makes them different to low molecular weight compound (3 p)
b) Provide a classification for polymers based on chemical structure (or functional groups), mechanical properties and their use in medicine giving one example for each case. (2 p)
c) Indicate the factors that affect degradation of bioabsorbable polymers. (1 p)

Question 4.

a) Explain the following graph after 10 years implantation. What has happened and why? (3p)



b) What are the benefits of using metal biomaterials over polymer or ceramic ones? (2 p)
c) Why would you use a semented total hip implant over the non-semented one? (1p)

Question 5.

a) How can you effect the properties of bioceramics by sintering? (3 p)
b) Explain, osteoconduction, osteoinduction by indicating how these phenomena can be seen on the surface of bioceramics/glasses and in the body? (2 p)
c) What is a HCA layer, why it is important and how it forms? (1 p)

Question 6.

a) Define a polymeric composite and give an example of a matrix and a filler used for preparing this type of composites. (3 p)
b) Define how biomedical composites can be classified according to their properties and mention 1 advantages and 1 disadvantage of biomedical composites. (2 p)
c) Give 1 example of a natural composite and 1 example of a commercial composite used in medicine. (1 p)