Exam 20\textsuperscript{th} of October 2017  
BMT-73106 Bioceramics and Their Clinical Applications  
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**Question 1 (6pts)**

Give a brief explanation of the three main cell in vitro testing discussed during the course  
(Direct contact test, Agar diffusion and Elution test)

**Question 2 (6pts)**

Define in your own word (you can use a schematic representation):

1- Osteoconduction vs. Osteoinduction

2- Osteobasts vs Osteoclasts

3- Index of Bioactivity

4- Compact bone vs Trabecular bone

**Question 3 (6pts)**

The figure below presents the relative bioactivity of materials along with the percentage of interfacial bone tissue as a function of time.

Define what type of biomaterials (Inert, bioactive, bioresorbable or porous ingrowth) corresponds to the type 1, 2, 3 and 4 and justify your answer. What tissue/implant reaction are you expected? Finally name two example of biomaterials that falls under those different material types.
Question 4(6pts)

Al₂O₃ and ZrO₂ are two bio-inert materials used in the medical field. Where are they used? What does it mean, in terms of interaction with the surrounding tissue, that they are inert? What are the main reasons for failure of these types of implant? Finally, how can we improve the properties of Bio-inert materials?

Question 5(6pts)

Calcium phosphate bioceramics are widely used clinically. How does the Ca/P ratio affect the degradability of a calcium phosphate ceramic? Name two (2) calcium phosphate ceramics, compare their dissolution rate and briefly explain for which application they are mainly used