

**UNIVERSITY COLLEGE LONDON**

**UNIVERSITY OF LONDON**

**EXAMINATION FOR INTERNAL STUDENTS**

**FOR THE FOLLOWING QUALIFICATIONS:**

**B.Sc. (Intercal)**

**Health Sciences C103: Biomaterial Science**

**COURSE CODE : HESCC103**

**UNIT VALUE : 0.5**

**DATE : 14-MAY-04**

**TIME : 10.00**

**TIME ALLOWED : 3 Hours**

Answer **FOUR** out of **SEVEN** (20 marks for each question)

Answer **EACH** question in a **SEPARATE** book

Use diagrams to illustrate your answers where possible.

1. Ceramic materials are described as being bio-inert or bioactive. With examples from each group, describe the fabrication, uses and benefits of using bio-inert and bioactive ceramics.
2. It is possible to group most modern tissue engineering biomaterials into 'synthetic polymer based' and 'native protein/polysaccharide based'. With examples of each, outline advantages and disadvantages of each group and explain how current research attempts to solve these problems.
3. Describe the differences in the biological and mechanical processes involved in aseptic loosening between an acetabular cup and a femoral stem.
4. Discuss the applications and limitations of a tissue engineering approach to the repair of tendon injury.
5. Biocompatibility implies that a material does not have a toxic effect when placed in the body.
  - a) What is the difference between BIOSAFETY and BIOFUNCTIONALITY?
  - b) Describe how you would assess the biocompatibility of an orthopaedic biomaterial.
6. Discuss the function of an orthopaedic bone cement in hip replacement and highlight the advantages and disadvantages of acrylic bone cements and comment on their current improvements.
7. Define:
  - i. Osseo-induction
  - ii. Osseo-conduction
  - iii. Osseo-integration
  - iv. Bone bonding.Give examples of biomaterials able to achieve these processes.