

**UNIVERSITY COLLEGE LONDON**

**UNIVERSITY OF LONDON**

**EXAMINATION FOR INTERNAL STUDENTS**

**FOR THE FOLLOWING QUALIFICATIONS:**

**M.Sc.**

**Orthopaedics 3002: Biomaterials and Biomechanics**

**COURSE CODE : ORTH3002**

**DATE : 20-MAY-05**

**TIME : 10.00**

**TIME ALLOWED : 3 Hours**

05-C1007-3-50

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**TURN OVER**

## **SECTION A**

Answer **TWO** questions out of the following **THREE** (25 marks per question)  
Use diagrams to illustrate your answer where appropriate

Answer each question in a **SEPARATE** book

1. Compare and contrast the kinematics of the normal knee with those of a replaced knee joint. What determines the kinematics of the knee joint in these two situations?
2. In uncemented implant fixation bone contact and osteointegration are essential for long-term implant success. Discuss how implant surfaces can be engineered to enhance bony integration and improve implant fixation.
3. Discuss the processes and mechanisms of using tissue engineering techniques in repairing non-union bone fracture.

## SECTION B

Answer **SIX** questions out of the following **EIGHT** (5 marks per question)  
Use diagrams to illustrate your answer where appropriate

Answer each question starting on a **NEW PAGE** of the answer book

1. Give 2 reasons for needing to know the forces acting at joints *in vivo*. Briefly contrast the techniques of *in vivo* measurement and mathematical modelling.
2. Describe advantages and disadvantages in using forged femoral components as opposed to a cast femoral component.
3. List 5 factors that affect bone apposition to the implant surface in the short term (up to 3 months) following surgery. List 5 factors that affect bone-implant interface in the long term (>3 months) following surgery.
4. Define the *fit* and *fill* concept in relation to the prosthetic hip stem in the femoral cavity. Give 2 reasons why *fit* is more clinically relevant than *fill*.
5. In total knee design, briefly describe the differences between the dished tibial tray and flat tibial tray in terms of their clinical applications.
6. List and briefly describe the classic stages of the fracture healing processes.
7. List the major advantages and disadvantages of using large femoral heads and small femoral heads in total hip replacements.
8. Describe the main features of posterior stabilized knee design and its function.