Menoufiya University **Faculty of Engineering, Shebin El-Kom** **Prod. Eng. & Mech. Design. Department** **First Semester Examination , 2013-2014**	**Subject: Biomaterials Code: 415 A** **Year : 4 th Year** **Time Allowed : 3 hours** **Total Marks : 70 marks** **Date of Exam : 16 / 1 / 2014**

Answer the following questions

(Question 1): (15 marks)

a) Recognize (تعرف) ميز the correct answer: **(5 marks)**

1) In order for bone growth to occur, the surface of the implant must be _____.
   A) smooth B) porous
   C) abrasive D) adhesive
2) Which property below would you NOT associate with the metals used to make the ball section of the hip joint?
   A) wear resistance B) high tensile strength
   C) high ductility D) stiffness
3) Which property of polymeric sutures helps them keep the wound closed?
   A) high tensile strength B) high thermo-plasticity
   C) low melting point D) low coefficient friction
4) Which of these materials is NOT used to build the ball section of a hip joint?
   A) chromium B) cobalt
   C) titanium D) silicon
5) Materials that eventually في آخر الأمر break down تتحلل in the body _____.
   A) are always toxic. B) cannot be used as biomaterials.
   C) can be used to construct long-term replacements for heart valves.
   D) can be used to construct "scaffoldings" on which natural cells grow.

b) Describe one method to achieve a porous ceramic surface indicating the influence of the surface structure of an implant on the strength of adhesion to the tissue. **(5 marks)**

c) Demonstrate وضح مستعينا بالأمثلة the use of stainless steels, CoCr-alloys and titanium alloys as a hard tissue replacement. **(5 marks)**

(Question 2): (15 marks)

a) List the main factors that should be considered for synthetic bone grafting materials. **(5 marks)**

b) Compare the tendons with the ligaments with respect to their formation and function. **(4 marks)**

Contrast أظهر الفرق بين the concept of biological fixation and the concept of morphological fixation indicating the limitations of both. **(6 marks)**

(Question 3): (15 marks)

a) List the types of bio-ceramics. Give examples. **(3 marks)**

b) Explain the different means وسائل of achieving attachment ارتباط of prostheses أعضاء اصطناعية to the musculo-skeletal system. **(5 marks)**

c) Design the total knee joint replacement (components, materials, and fixation) **(5 marks)**

d) Describe considerations for the design of heart valves. **(2 marks)**

(Question 4): (13 marks)

a) Design the prosthesis for total hip replacement. **(4 marks)**
b) Explain any two of dental materials in detail. **(4 marks)**
c) Demonstrate that the use of the PE-HA composites are superior to those of bio-ceramics among implant materials when bone is to be replaced . **(5 marks)**

(Question 5): (12 marks)

a) Define natural polymers. Give examples, and explain their importance in the area of tissue-engineering. **(5 marks)**
b) Compare resin teeth with porcelain teeth. **(4 marks)**
c) Compare bone-cement fixation with porous ingrowth fixation. **(4 marks)**

With our best wishes

This exam contributes "by measuring" in achieving Programme Academic Standards according to NARS															
Question Number	Q1-a	Q2-a	Q3-a	Q4-b	Q5-a	Q1-b	Q2-b	Q3- c	Q4-a	Q5-b	Q1-c	Q2-c	Q3-c	Q4-c	Q5-b
Skills	a13-1	a13-1	a13-1	a13-1	a13-1			b18-1	b18-1		c2-1	c2-1		c2-1	
	Knowledge & Understanding Skills					Intellectual Skills					Professional Skills				