Total No. of Questions : 6]

SEAT No. :

P3760

[Total No. of Pages : 2

[4760] - 53

M.E. (Civil Structures)

BIO MECHANICS AND BIO MATERIALS (Elective - IV)

(2008 Pattern) (Semester - II)

Time :4 Hours] *[Max. Marks :100*

Instructions to the candidates:-

1) ***Solve any two questions from each section.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Explain soft tissue and Hard tissue with suitable illustration. Explain engineering properties of hard tissue. **[8]**

b) Explain various elastic models applicable to soft tissue and hard tissue. Draw suitable diagram to illustrate. **[9]**

c) Enlist and Explain applications of study of human Biomechanics. **[8]**

Q2) a) Explain material bio compatibility and List bio compatible materials used widely in treating human illnesses. Illustrate your answer with suitable application. **[8]**

b) Explain various non metallic materials used as bio compatible materials with its Advantages and application. **[9]**

c) Explain use of ceramics as replacement components /artificial fixation devices. **[8]**

P.T.O.

Q3) a) Explain bone cement, PMMA. Explain its advantage as biomaterial. **[8]**

b) Explain silicon rubber, UHMWPE, ultra high molecular weight poly ethylene as biocompatible material. **[9]**

c) Explain properties of stainless steel, cobalt base alloys, Titanium base alloys when used as prosthesis material. **[8]**

SECTION - II

Q4) a) Explain in brief anisotropy, transverse isotropy, orthotropy for bone tissue. **[9]**

b) Explain geometry of the articulating joint for ankle joint, Knee joint, Hip joint. Show joint forces acting on each. **[9]**

c) Explain device to measure wear of cartilage on cartilage material. **[7]**

Q5) a) Explain the term gait analysis. **[8]**

b) Enlist and explain various measurement techniques for body motion. **[9]**

c) How gait analysis helps in various applications of Biomechanics study. **[8]**

Q6) a) What are the fundamental design consideration for engineering design of prosthesis. **[8]**

b) Explain step by step structural design cycle of a fixation device in biological environment. **[9]**

c) What is the classification of prosthetics devices.enlist prosthetics widely used and the situations in which they are required to be used. **[8]**

❄❄❄