Total No. of Questions : 6]

SEAT No. :

P3980

[Total No. of Pages : 2

[4860] - 52

M.E. (Civil) (Structures) (Semester - II)

BIOMECHANICS AND BIOMATERIALS

(2008 Pattern) (Elective - IV (a))

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

Instructions to the candidates:

1) ***Solve any two questions from each section.***
2) ***Answers 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) Enlist hard and soft tissues with respect to its elastic nature. **[8]**

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

c) State advantages and applications of study of human Biomechanics. **[8]**

Q2) a) Explain the meaning of Biocompatibility of material in structural sense. **[8]**

b) Enlist various biocompatible materials used as application to biomechanics problem and state its suitable application. **[9]**

c) What are fixation devices, Enlist and sketch at least three fixation devices. **[8]**

Q3) a) Explain bone cement with its biomedical application, State its advantages and disadvantages, as biomaterial. **[10]**

b) Explain engineering properties of stainless steel, cobalt base alloys, Titanium base alloys when used as prosthesis material. **[15]**

P.T.O.

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 Gait cycle with reference to Human Motion. **[7]**

Q5) a) Enlist various tests asper ASTM standards, carried out for fixation devices like Bone Plate, screws and explain at least one in short. **[8]**

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

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

Q6) a) What are the fundamental design consideration for engineering design of Joint replacement prosthesis like Hip joint. **[8]**

b) Explain step by step structural design cycle of a fixation device for knee joint. **[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]**