Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(CT)/SEM-7/CT-703A/2009-10

2009

BIO-CERAMICS

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* Questions. 5 ∞ 14 = 70

1. Define biomaterial substance ? Name the different biomaterials used in human body. What is an implant ? State the prerequisites for any synthetic material to be implanted in human body. What is bio-ceramics ? Name any four. 3 + 2 + 2 + 4 + 2 + 1

2. Define biocompatible and biofunctionality. Draw the effect of age on the strength of the bone and probability of fracture. Why does bone density decrease with age ? What is osteoporosis ? What type of harsh environment is faced by bioceramics in human body ? (2 ∞ 2) + 3 + 2 + 2 + 3

3. Jot down the composition of human bone. Name the different layers of a lining bone. What is arthritis ? When is total joint replacement necessary ? What are the problems with metal implants and polymer implants ? $2 + 3 + 2 + 3 + (2 \infty 2)$

4. State the different types of implant tissue respose. Briefly descrbe the different types of bioceramic-tissue attachment and bioceramic classification with example. Mention the two applications of bioceramics in human body. Why has alumina been used in orthopaedic surgery for last 30 years ?

$2 + 6 + 3 + 3$

5. Mention the stability of different phases of calcium phosphate at body temperature in contact with aqueous & mild alkali media. Briefly describe the synthesis of hydroxyapatite. Narrate the mechanical behaviour of calcium phosphate bioceramics. How does the bioactive HA work in the interface ? $3\frac{1}{2} + 4 + 3\frac{1}{2} + 3$

6. What is bioactive glass ? How this type of glass differs from conventional glass ? What does the formula 45 S5 signify ? How is the bioactive glass synthesized ? Briefly describe the process of adherence of bioactive glass to tissues.

$2 + 3 + 2 + 4 + 3$

7. Write short notes on any *four* of the following : $4 \times 3\frac{1}{2}$

a) Biological glass-ceramic

b) Bio-ceramic coated implants

c) Carbon as a bioceramic material

d) Chemical vapour deposition as a technique for bioceramic coating.

e) Preparation of bio-ceramic alumina.