Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH (CT)/SEM-7/CT-703A/2011-12

2011

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 with examples. How do implants differ from graft ? Briefly state the prerequisites for any synthetic material to be implanted in a living body. Define biocompatibility and bio-functionality. What is Osteoporosis ? 3 + 1 + 5 + 4 + 1

2. State the different types of implant-tissue response. Describe the different types of bioceramics tissue attachments and bioceramic classification. How type 2 implants work at the tissue-implant interface ? What are the limitations of this type 2 implants ? State the different applications of bioceramics in our human body. $3 + 4 + 2\frac{1}{2} + 2\frac{1}{2} + 2$

3. How do bioactive materials differ from resorbable biomaterials ? What are problems with resorbable bioceramics ? Discuss the stability of different calcium phosphate at body temperature in contact with aqueous media. Describe the synthesis of hydroxy-apatite. State the dependence of mechanical properties of calcium phosphate on porosity. $3 + 3 + 4 + 2\frac{1}{2} + 1\frac{1}{2}$

4. What is bioactive glass ? How does bioactive glass differ from common glass ? What does 45S5 signify ? Briefly describe the different reaction stages of bioactive glass tissue interface. How are bioactive glass/glass ceramics manufactured ? $2 + 2 + 2 + 4 + 4$

5. Why do we need bioceramic material ? Draw the effect of age on the strength of bone and probability of fracture. What type of harsh environment and mechanical stresses are faced by implants within human body ? Alumina has been used in orthopaedic surgery for last 3-4 decades. Why ? Briefly describe the preparation of alumina used for implants. Alumina ball and socket pairs are preferred to metal polythene pair. Why ? $2 + 2 + 3 + 5 + 2$

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

   a) Cold isostatic pressing

   b) Carbon as bioceramic matrial

   c) Function of micropores in bioceramic materials

   d) Advantages and disadvantages of type 4 bioceramics

   e) Composition and constituents of human bone

   f) Physical vapour deposition method of coating.