

Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (BME)/SEM-4/BME-401/2010

2010

BIOMATERIALS

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.

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) Bioglass is a/an

- a) inert ceramic
- b) bioactive ceramic
- c) composite
- d) crystalline polymer.

ii) The most preferred metallic dental implant material is

- a) Tantalum
- b) Vitallium
- c) Titanium
- d) Aluminium.



iii) Polymeric biomaterials are generally sterilized by

- a) dry heat sterilization
- b) moist heat sterilization
- c) gas sterilization
- d) gamma sterilization.

iv) Pitting is associated with

- a) dissolution
- b) corrosion
- c) solution
- d) absorption.

v) IOL is made from

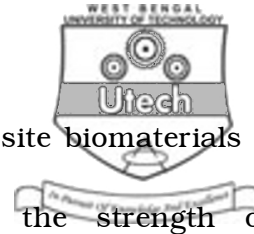
- a) polyvinyl chloride
- b) polylactic acid
- c) polymethyl methacrylate
- d) polyethylene.

vi) The hardest biological material is

- a) dentin
- b) enamel
- c) gum
- d) bone.

vii) The streaming (zeta) potential of blood vessel is

- a) 1 to 5 mV
- b) 8 to 13 mV
- c) - 1 to - 5 mV
- d) - 8 to - 13 mV.



5. What are the main importances of composite biomaterials ? Describe the mechanics of improving the strength of composites. 2 + 3
6. What are the possible uses of ceramics ? Give the advantages and disadvantages of ceramic implants. 2 + 3
7. Briefly explain about the different methods of prosthesis fixation with bone.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. Explain the possible biocompatibility problems of biomaterials. Which tests are to be performed for newer biomaterials before clinical trials ? 8 + 7
9. a) What are the primary uses of metallic implant materials ? Mention the uses of 316 SS, Co-Cr alloy, Ti and its alloy in orthopaedic and dental surgeries. 2 + 3
- b) Describe the ceramic/bone tissue reaction. 4



- c) Give some applications of pyrolytic carbon and glass ceramics. Give some uses of bioresorbable ceramics in medical field. 3 + 3

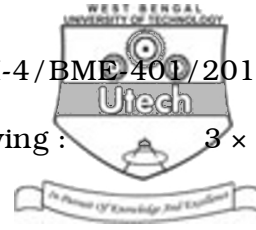
10. Define the term 'biopolymers'. Classify polymeric biomaterials with examples. Describe the following terms in the field of polymers :

- a) Syndiotactic
- b) Isotactic
- c) Atactic
- d) Radical polymerization
- e) Silicone rubber
- f) PMMA.

2 + 3 + 10



11. a) Draw stress-strain curve of a ductile material indicating the salient points and explain each point. 7
- b) Laboratory test on human tooth shows that effective area of chewing is 0.04 inch^2 and length 0.41 inch . If the applied load is 200 lb then reduction in length is 0.0015 inch . Find out the Young's modulus of tooth. 6
- c) What is fracture toughness? 2
12. a) Briefly discuss about the different sterilization techniques for sterilization of biomaterials. 6
- b) Describe the effects of sterilization on the properties of biomaterials. 6
- c) What is wear? Classify wear. 3



13. Write short notes on any *three* of the following : 3 × 5

- a) Orthopaedic implants
 - b) PMMA bone cement
 - c) Pyrogenicity test
 - d) Percutaneous and skin implants
 - e) Hemolysis test.
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