



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH (BME-OLD)/SEM-4/BME-401/2013

2013

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 :

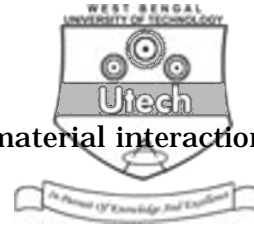
10 × 1 = 10

i) The outermost hard layer of teeth is called

- | | |
|--------------|-----------|
| a) Dentin | b) Enamel |
| c) Endosteal | d) Gum. |

ii) Elastin is a

- a) carbohydrate
- b) protein
- c) polysaccharide
- d) fat.



iii) The first phenomenon during blood-material interaction is

- a) platelet interaction
- b) albumin adsorption
- c) intrinsic coagulation
- d) fibrinogen polymerization.

iv) The most preferred metallic dental implant material is

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

v) Bioglass is a

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

vi) The hardest biological material is

- a) Dentin
- b) Enamel
- c) Gum
- d) Bone.



vii) Pitting is associated with

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

viii) Strength of a material is its

- a) surface properties
- b) mechanical properties
- c) chemical properties
- d) biological properties.

ix) Resorbable suture is made from

- a) silicone rubber
- b) nylon
- c) polylactic acid
- d) polyvinyl chloride.

x) Hydrogel is used to improve the

- a) blood compatibility
- b) tissue compatibility
- c) contour
- d) mechanical properties.

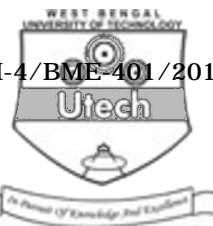


GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Define the terms 'biomaterial' and 'biocompatibility'. Briefly discuss about the necessity of biomaterials and classify them. $2 + 3$
3. What are the primary uses of metallic implant ? Briefly discuss about the corrosion problem of metallic implant. $2 + 3$
4. Classify bioceramics with appropriate examples. Why are ceramic materials more advantageous over metallic implant ? $2 + 3$
5. Classify bio-ceramics with appropriate examples. Give the advantage and disadvantage of ceramic materials. $2 \frac{1}{2} + 2 \frac{1}{2}$
6. Define composite. What are the important features of composite biomaterials ? Classify composite biomaterials. $1 + 2 + 2$
7. Draw the stress-strain diagram of metallic (ss316L) and ceramic biomaterials. What is the back bone structure of silicone rubber ? What are the applications of polyurethane biopolymer ? $3 + 1 + 1$



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. What are the different toxicity testing protocols for evaluation of a biomaterial ? Describe *in vitro* and *in vivo* toxicity screening test for newer biomaterials. $6 + 9$
9. Classify biomedical polymer with suitable examples. Briefly discuss the uses of biodegradable polymer in biomedical field. What are the importances of passive film layer for tissue adhesion ? Name at least three synthetic polymeric membranes and their application. $3 + 5 + 3 + 4$
10. a) Name four mechanical testings.
- b) Describe the tensile testing of a metallic biomaterial.
- c) What are the data one can get from such a test regarding the mechanical properties of the material ?
- d) What is fracture toughness ? $4 + 5 + 4 + 2$



11. Discuss about the uses of Ti and its alloys in dental surgery.

Which tests are to be performed for newer biomaterials

before clinical trials ? Describe the following terms in the

field of polymers :

a) Syndiotactic

b) Isotactic

c) Atactic.

5 + 6 + 4

12. a) Name/classify different crystal systems.

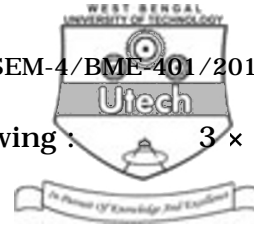
b) Name different crystal defects.

c) What are the primary uses of metallic implant materials ? Mention the uses of 316L SS, Co-Cr alloy in orthopaedic and dental surgery.

d) What are the possible biomedical uses of ceramics ?

e) Why are ceramic materials more advantageous than metallic implant ?

$3\frac{1}{2} + 1\frac{1}{2} + (2 + 3) + 2 + 3$



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

- a) Orthopaedic implants
- b) Pyrogenicity test
- c) Percutaneous and skin implants
- d) Haemolysis test
- e) Standards of implant materials.

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