

MODEL QUESTION PAPER
SIXTH SEMESTER B.TECH DEGREE EXAMINATION
BRANCH: BIOTECHNOLOGY & BIOCHEMICAL ENGINEERING
13.603: BIOMATERIALS AND TISSUE ENGINEERING

Time: 3 Hours

Marks: 100

PART A

(Answer all questions, each question carries 2 marks)

1. Define biomaterial and biocompatibility.
2. Illustrate the principle of ESCA and its relevance in tissue engineering.
3. Outline how you would produce poly dextrose from bacteria.
4. List two biological applications of composites with respect to their mechanical properties.
5. Differentiate ceramics and glass ceramics.
6. What are the advantages and disadvantage of PHB? Explain PHBV
7. Explain the basic steps in wound healing.
8. What are the possible host responses to implant?
9. Write any two novel scaffolds in tissue engineering.
10. Briefly explain the role of PDGF in tissue engineering.

PART B

(Answer any one question from each module)

MODULE I

11. (a) Explain why carbohydrates are well suited as biomaterials. (4)
- (b) Explain the structure and function of collagen. (8)
- (c) Explain the properties and biomedical applications of three natural polysaccharides. (8)

(OR)

12. Elaborate on the following methods for characterizing biomaterials.
- (a) UV-Visible spectroscopy (6)
- (b) Auger Spectroscopy (7)

(c) NMR spectroscopy (7)

MODULE II

13 (a) What is a biopolymer? How the properties of a biopolymer are evaluated? (10)

(b) Discuss about biodegradable polymers. (10)

(OR)

14 (a) Give the classification of bio-ceramic material for medical applications. (10)

(b) Define tribological and electrical behavior of composites. (10)

MODULE III

15 (a) Which stage of stem cell development is best suited for tissue engineering? Why? (10)

(b) Explain hormones and growth factor signaling in tissue engineering. (10)

(OR)

16 (a) Explain bioreactor and their application in functional tissue engineering. (10)

(b) Discuss the recent developments in the use of tissue engineering in therapeutics. (10)

MODULE IV

17 (a) What are scaffolds? Describe the methods which are used for the synthesis of scaffolds. (10)

(b) Explain how porosity and other characteristics can be controlled and measured in scaffolds. (10)

(OR)

18. Using the bottom up approach and the fundamental principles of tissue engineering, how will you produce skin? (20)