



**M.TECH DEGREE EXAMINATIONS: NOV/ DEC 2024**

(Regulation 2024)

First Semester

**TECHNICAL TEXTILES**

24TXT501 Absorbable and Biodegradable Polymers

**COURSE OUTCOMES**

- CO1: Apply knowledge of the evolution of absorbable and biodegradable polymers to identify suitable materials for specific applications
- CO2: Analyze the composition and properties of segmented copolyesters to determine their suitability for various suture applications.
- CO3: Evaluate advances in polyethylene glycol-based copolyesters to assess their potential in biomedical and drug delivery applications.
- CO4: Design innovative chitosan-based systems for pharmaceutical, biomedical, and healthcare applications using recent advancements.
- CO5: Examine the latest evaluation methods to determine the toxicity and biocompatibility of absorbable/biodegradable polymer systems.

**Time: Three Hours**

**Maximum Marks: 100**

**PART A (4\*20 = 80 Marks)**

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|----|----|--|----|-----|-------------------|
| 1. | a) | Compare homochain and heterochain polymers   | 4  | CO1 | [K <sub>2</sub> ] |
|    | b) | Outline the key processing methods used in the production of absorbable/biodegradable polymers.  | 4  | CO1 | [K <sub>2</sub> ] |
|    | c) | Analyze the evolution of natural absorbable and biodegradable polymers, focusing on key advancements in their development.   | 12 | CO1 | [K <sub>5</sub> ] |
| 2. |    | Scenario: A 6-month-old infant underwent open-heart surgery to repair a congenital heart defect. The surgical team required a suture that provided long-term support for the delicate cardiac tissue while minimizing the need for suture removal in the future. |    |     |                   |
|    | a) | Explain the types of sutures available and their properties.   | 4  | CO2 | [K <sub>2</sub> ] |
|    | b) | Explain the importance of biocompatibility in suture materials used in delicate cardiac tissues, especially in infants.  | 4  | CO2 | [K <sub>5</sub> ] |
|    | d) | Choose the best type of suture for the long-term support and the potential need for future surgeries or suture removal.  | 12 | CO2 | [K <sub>5</sub> ] |

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|----|----|---|----|-----|-------------------|
| 3. | a) | Explain the role of nanospheres made of A-B Block copolymer as novel drug carrier   | 4  | CO3 | [K <sub>5</sub> ] |
|    | b) | Identify the key advantages of using solid PEG-based copolyesters in wound healing compositions                           | 4  | CO3 | [K <sub>3</sub> ] |
|    | c) | Discuss the role of in situ cross-linkable PEG-based copolymers in protein-controlled delivery systems.                   | 12 | CO3 | [K <sub>6</sub> ] |
| 4. | a) | Outline the properties of chitosan-based materials (CBS)  | 4  | CO4 | [K <sub>2</sub> ] |
|    | b) | Briefly explain how CBS can be used in wound healing.   | 4  | CO4 | [K <sub>5</sub> ] |
|    | c) | Discuss the advances in processing techniques of chitosan-based materials and their clinical relevance. Provide examples. | 12 | CO4 | [K <sub>6</sub> ] |

**Answer any ONE Question**

**PART B (1\*20 = 20 Marks)**

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|----|----|--|----|-----|-------------------|
| 5. | a) | Explain the influence of polymer processing on the toxicity of biodegradable and absorbable polymers | 4  | CO5 | [K <sub>2</sub> ] |
|    | c) | Analyze the critical test methods for implants and drug carriers.                                    | 16 | CO5 | [K <sub>4</sub> ] |

OR

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|----|----|---|----|-----|-------------------|
| 6. | a) | Demonstrate the common methods of toxicity testing for biodegradable polymers                                       | 4  | CO5 | [K <sub>2</sub> ] |
|    | c) | Critically analyze the biocompatibility and toxicity concerns related to absorbable and biodegradable drug carriers | 16 | CO5 | [K <sub>4</sub> ] |

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