DEPARTMENT OF BIOCHEMISTRY

CERTIFICATE COURSE IN

FUNDAMENTALS OF TISSUE ENGINEERING

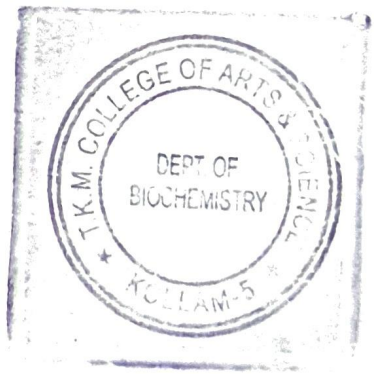
ACADEMIC YEAR 2023-24

CURRICULUM

COURSE COORDINATOR

Dr. SUMAYYA. A. S.

ASSISTANT PROFESSOR



CERTIFICATE COURSE IN FUNDAMENTALS OF TISSUE ENGINEERING

Course overview: The Certificate Course in Fundamentals of Tissue Engineering provides a basic understanding of tissue engineering principles, focusing on techniques to create, repair, or replace biological tissues using cells, biomaterials, and growth factors.

Duration: 30 Hours

Objectives:

- Introduce the basic concepts of tissue engineering.
- Explain the principles of cell biology and tissue structure.
- Highlight the importance of biomaterials in tissue engineering.
- Describe the techniques for cell culture and scaffold design.
- Discuss the role of growth factors in tissue regeneration.
- Provide knowledge on tissue repair and regeneration processes.
- Explore the applications of tissue engineering in medicine.
- Familiarize students with ethical considerations in tissue engineering.
- Develop practical skills for handling tissue engineering tools.
- Encourage research and innovation in tissue engineering.

Course outcome: The course will provide a foundational understanding of tissue engineering principles, techniques, and applications, preparing learners to explore innovative solutions for tissue repair and regeneration.

Assessment Procedure

Assessment is done through continuous evaluation (attendance and assignment) and final evaluation (MCQ test)

A Grade: 80 % and above, B Grade: 60-79%, C Grade: 40- 59%, Below 40% D Grade

COURSE CONTENT

Module 1: Introduction to Tissue Engineering **(6 hrs)**

History and Overview of Tissue Engineering, Basic Cell Biology, Biomaterials in Tissue Engineering, Types of biomaterials, Biocompatibility and biodegradability

Module 2: Cell Sources and Culture Techniques **(6hrs)**

Cell Sources- Primary cells, Stem cellsandCell lines;Cell Isolation and Expansion, Techniques for cell isolation, Cell culture methods

Module 3: Scaffold Design and Fabrication **(6hrs)**

Scaffold Materials, Natural vs. synthetic materials, Composite materials; Scaffold Fabrication Techniques- Electrospinning, 3D printing, Decellularization

Module 4: Clinical Applications and Challenges **(6 Hrs)**

Tissue Engineering for Skin and Bone, Skin grafts and wound healing, Bone regeneration and repair; Cardiovascular Tissue Engineering, Heart valves, Blood vessels; Tissue Engineering for Organs- Liver, Kidney

Module 5: Challenges in Clinical Translation **(6hrs)**

Regulatory issues, Ethical considerations andCommercialization.

References

- Biomaterials Science: An Introduction to Materials in Medicine (4th Edition)by Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, and Jack E. Lemons.
- Fundamentals of Tissue Engineering and Regenerative Medicine by Ulrich Meyer, Thomas Meyer, JörgHandschel, and Hans Peter Wiesmann.
- Tissue Engineering and Regenerative Medicine by Bernhard O. Palsson, G. Vunjak-Novakovic, and William L. Bonfield.
- Journal of Tissue Engineering and Regenerative Medicine

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