



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3162916
Semester – VI
Subject Name: Medical Textile

Type of course: Open Elective

Prerequisite: Basic Knowledge of Technical Textile

Rationale: It is important to understand the role of Biomaterials in the form of fibers, filaments, yarns, and fabrics serving as a host of clinical needs as part of implantable, non-implantable, and extracorporeal devices spanning areas as diverse as tissue repair and regeneration, chronic wound healing, prosthetics, drug delivery, ostomy and blood filtration, amongst others.

Medical textiles aims to consider all aspects of the manufacture, structure, and properties of textile-based biomaterials designed to interact with cells or biological fluids to facilitate the restoration of specific functions of the body, as well as for tissue repair and regeneration and for healthcare and hygiene.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
3	0	0	70	30	0	0	100	

Content:

Sr. No.	Content	Total Hrs
1	TYPES AND PROPERTIES OF MEDICAL TEXTILES Types of textiles and biomaterials for medical applications – Key properties of medical textile products -	2
2	ADVANCE TEXTILE FOR WOUNDCARE Wound Management and dressings – Interactive dressings and their role in moist wound management – Bioactive dressings to promote wound healing – Advanced textiles for wound compression – Drug delivery dressings - Classification of drug releasing textiles – Fabrication and Characterization - Applications	8
3	TEXTILES FOR IMPLANTS AND REGENERATIVE MEDICINE Introduction – Textiles for Implants – Biomedical textiles for Orthopaedic and Surgical Applications - Embroidery technology for hard-tissue scaffolds- Textiles for Regenerative medicine -Nonwoven scaffolds for bone regeneration	6
4	MEDICAL TEXTILES AND THERMAL COMFORT Fundamental of thermal comfort – Thermal comfort of medical textiles – Surgical gowns	2
5	NON-WOVEN MATERIALS AND TECHNOLOGIES FOR MEDICAL APPLICATIONS Introduction- Types of nonwoven materials used for hygiene products- Properties of nonwoven materials- Strengths and limitations of non-wovens for medical applications- Applications / examples- Wound care products- Medical gauze-Wadding- Surgical gowns-	8

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	Surgical caps - Surgical masks- Drapes and cover cloths- Bed linen – Clothing - Incontinence products-Cloths & wipes- Feminine sanitary napkins – Underpads-Tampons –Nanofibrous textiles in medical applications - Future trends	
6	SUPERABSORBENTS AND THEIR MEDICAL APPLICATIONS Introduction – Forms of superabsorbents and their properties – Applications in medicine – Applications in Medical textiles and hygiene products- Applications for comfort improvement	4
7	ANTIMICROBIAL TEXTILES Introduction – Development of antimicrobial textiles- Technologies in creating antimicrobial textiles – Microencapsulation – Sol gel – Plasma – Nanotechnology- Applications of Antimicrobial textiles – for medical environment; for Sutures, Implants, & Scaffolds; for treating skin infections; for Protective Clothing.	6

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	20	30	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Applications of nonwovens in technical textiles, Edited by R.A.Chapman, Woodhead Publishing Ltd., 2010, ISBN 978-1-84569-437-1.
2. Medical textiles & biomaterials for healthcare, Edited by S.C.Anand et al, 2006, Woodhead Publishing Ltd. ISBN -13:978-1-85573-683-2.
3. Handbook of Medical textiles, Edited by V T.Bartels, Woodhead Publishing Ltd., 2011, ISBN 1 84569 691 3.
4. Antimicrobial Textiles, Edited by Gang Sun, Woodhead Publishing Ltd in association with The Textile Institute, 2016, ISBN 978-0-08-100576-7.
5. Biomedical Textiles for Orthopaedic and Surgical Applications, Edited by Todd Blair, Woodhead Publishing Ltd, 2015, ISBN 978-1-78242- 017-0.
6. Advanced Textiles for Wound Care, Edited by S. Rajendran, The Textile Institute and Woodhead Publishing, 2019, ISBN 978- 0-08-102192-7.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Describe the key properties of medical textiles	5



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CO-2	Discuss wound management and dressings and characterize and fabricate wound care products.	25
CO-3	Discuss the textile for implants, biomaterials for Orthopaedic and surgical applications, regenerative medicines.	15
CO-4	Describe the thermal comfort of medical textiles.	5
CO-5	Describe the non-woven materials and technologies for medical applications and forecast future trends.	25
CO-6	Discuss forms of superabsorbents and their properties and applications in medical textiles and hygiene products.	10
CO-7	Develop antimicrobial textiles using advanced technologies.	15

List of Open Source Software/learning website: Any Search Engine, NPTEL, Swayam portal