Subject Description Form

Subject Code	**SFT306FI**
Subject Title	**Technical Textiles**
Credit Value	**3**
Level	**3**
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The subject develops an understanding of the concepts, principles, materials, structures, and properties as well as manufacturing processes of technical textiles, including geotextiles, medical textiles, personal-protection textiles, automotive textiles, and architectural textiles. It identifies the performance requirements of these technical textile products and their evaluation technologies. It also assesses the broad range of latest developments in these areas.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) understand various types of technical textiles; (b) understand the application of fibrous textile materials in the development of technical textiles; (c) learn to evaluate various technical textiles; (d) develop self-learning ability to adapt to new technologies and update their knowledge; (e) develop critical and creative thinking; (f) cooperate efficiently in a team to achieve goals.
Subject Synopsis/ Indicative Syllabus	(I) **Introduction** Definition and growth of technical textiles; Classification and application in different industrial sectors; Role of yarn, fabric and composite materials for manufacturing technical textiles. (II) **Composites** Basic concepts, classification, manufacturing techniques, fiber-reinforced composites, applications, reuse & recycling, testing protocols. (III) **Geotextiles and Architectural Textiles** Classification, main functions, and applications of geotextiles and architectural textiles; Fibre and fabric selection criteria for applications; Reinforcement, filtration and drainage by geotextiles; Concepts of tensegrity structures.

	(IV) **Automotive Textiles:** Application of textiles in automobiles, fiber requirement for various applications, brakes, airbags, seat belt restraint systems, inflators, propellant, seat fabrics, carpets, and trims; Application in aircraft and marine; Textile as structural elements in transport vehicles; Testing of materials. (V) **Medical Textiles:** An overview, classification: Nonimplantable materials, implantable materials, Extracorporeal, Health care and hygiene, Medical textile products and processes. Testing methods and international standards. Polymers in biomedical use – natural and synthetic, biodegradable synthetic polymers. Biodegradable nanospheres. Hydrogels in biomedical and pharmaceutical sciences, Antimicrobial textiles- various methods and testing. Application of phase change and shape memory materials in medical textiles, compression stockings, and heat therapy patches. (VI) **Personal Protection**: An overview, classification, Protective clothing, anti-flash hoods and gloves, helmets, survival suits, ropes and harnesses, protection against Fire, protection against hazardous and dangerous liquid-based materials, protection against extreme climate, protection against toxic gasses and vapors, protection against cold water, protection against a ballistic impact, and high visibility warning clothing.
Teaching/Learning Methodology	**Lectures will be used to introduce the principles, development process, and application of different technical textiles.** Laboratory sessions involve practical development and analysis of different technical textiles to provide a hands-on experience of the subject and supplement the lecture series. Seminars will be provided by key industrialists or researchers who have substantial industrial or research experience in these technical textiles. Students will be encouraged to study under the guidance of the lecturers/tutors, and present the findings of their analysis of different products. Group projects and student presentations will be the key platform for developing self-learning ability. Individual Assignments, quizzes, laboratory works, group projects and presentations will be the major parts of the continuous assessment components of the coursework.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	f
Continuous Assessment	50%	✓	✓	✓	✓	✓	✓
1. Group Project and/or presentation/assignment/quiz	25%	✓	✓	✓	✓	✓	✓
2. Laboratory Report	25%	✓	✓	✓	✓	✓	
Examination	50%	✓	✓	✓	✓	✓	
Total	100%						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

In the continuous assessment, by group projects and individual laboratory reports, the focus will be made on all-rounded education and self-learning ability. In addition to professional knowledge, the importance of teamwork, critical and creative thinking, the ability to adapt new technologies and update knowledge by self-learning, as well as the ability to source, select and integrate information will be stressed. For example, interaction among group members will be a very good way for enhancing communication skills, and promoting teamwork spirit. To gain systematic technical knowledge/skills, students will also be given some questions as assignment or quiz.

In the examination, students' learning performance in terms of defining concepts, explaining principles, and describing and analyzing applications of technical textile products and related manufacturing processes will be assessed.

Student Study Effort Expected	Class contact:	
	• Lecture	22 Hrs.
	• Practical	12 Hrs.
	• Seminar/Tutorial	04 Hrs.
	Other student study effort:	
	• Assignment	25 Hrs.
	• Self Study	42 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	Horrocks, A. R., Anand, Subhash C. (2016), Handbook of Technical Textiles: Technical Textile Applications, Cambridge: Elsevier Science & Technology; Mogahzy El, Cambridge Y. (2008), Engineering Textiles: Integrating the Design and Manufacture of Textile Products, Elsevier Science & Technology. Miao, Yuyang. ; Yougi Wang (2005), Ph.D. Thesis, Mechanics of textile composites from geometry to mechanical properties, Kansas State University. Koerner R. M. (editor), (2016) Geotextiles: from design to applications, Amsterdam, Elsevier, Netherlands. Vinay Midha (editor); Mukhopadhyay A. (editor)(2021), Recent trends in traditional and technical textiles: select proceedings of ICETT 2019, International Conference on Emerging Trends in Traditional & Technical Textiles (2019: Jalandhar, India); Springer, Singapore. Mukhopadhyay, S. K., Partridge, J. F.(1999) Automotive textiles,Textile progress, Vol.29 (1-2), p.1-125. Bartels, V. T. (2011), Handbook of medical textiles, Textile Institute, Woodhead Pub, Cambridge. Shahid Ul-Islam (editor); Butola, B. S. (editor) (2020), Advances in functional and protective textiles, Duxford, England: Woodhead Publishing. McCarthy B. J., McCarthy B. J. (2013), Polymeric protective technical textiles, Smithers Rapra, Shrewsbury.	