Department of Textile Technology

Report for Review committee

7- 8 March 2014

Indian Institute of Technology Delhi

Department of Textile Technology

(Report for Review committee)

1. Curriculum

1.1 List of degree programmes offered - UG + PG - and enrollment.

Degrees offered	Enrollment for academic year 2013-14
B .Tech	
Textile Technology	102
M. Tech	
Textile Engineering	13
Fibre Science & Technology	11
Ph. D	12

1.2 Consistency of curricula with academic vision of the department.

The curriculum is consistent with the vision; however necessary changes have been / are being made in the revised curriculum.

1.3 Quality of programmes:

(a) Periodicity of curriculum review UG and PG (*relevant documents*).

The curriculum of IIT Delhi is reviewed and revised every ten years. Recently the UG curriculum has been revised and new curriculum has been implemented in July 2013.
The PG curriculum review has been initiated. However, new courses are added, as when necessary.

(b) Mechanism for review at UG and PG level (*relevant documents*).

The curriculum review is initiated by Dean (academic) . A committee known as Curriculum Review Committee (CRC) is formed taking members from each department. The committee deliberates over various aspects of review that includes discussion with all stake holders viz. recruiters, students, alumni and faculty. A draft proposal of the structure of the curriculum is made after lot of brain storming sessions and sent to all stake holders for their feedback. Based on the feedback a final proposal is made for ratification in the senate. Departments are requested to make templates of the various courses to be offered by the department. The templates of all the courses are sent to senate for approval.

(c) Coursework for each UG, PG and PhD programme - Core / Elective.

Bachelor programme in Textile Technology

Programme Code: TT1 / (TT)

The overall credits structure

Undergraduate Core (UC)		**Undergraduate Elective (UE)**	
Category	Credits	Category	Credits
DC	63	DE	27
BS	20	HM	14
EAS	20	OC	34
HU	2		
TOTAL	105	TOTAL	75

Total credits = 180

Core Courses	**Course no**	**Course title**
Basic Sciences (BS)	CYL120	Inorganic and Organic Chemistry: Concepts and Applications
	CYP100	Chemistry Laboratory
	MAL110	Mathematics - I
	MAL140	Probability and Statistics
	PHL110	Fields and Waves
	PHP100	Physics Laboratory
Engineering Arts and Sciences (EAS)	AML120	Materials Science
	CSL101	Introduction to Computers and Programming
	CSL102	Introduction to Computer Science
	EEL102	Principles of Electrical Engineering
	MEL110	Graphic Science
	MEL120	Manufacturing Practices
Humanities and Social Sciences (HC)	HUN100	Introduction to Humanities and Social Sciences

Departmental Core (DC)

CYL230 Polymer Chemistry
TTC410 Colloquium (TT)
TTD411 Major Project Part 1 (TT)
TTL211 Structure and Physical Properties of Fibres
TTL212 Manufactured Fibre Technology
TTL221 Yarn Manufacture - I
TTL222 Yarn Manufacture - II
TTL231 Fabric Manufacture - I
TTL232 Fabric Manufacture - II
TTL241 Tech. of Textile Preparation and Finishing
TTL242 Technology of Textile Colouration
TTL361 Textile Testing
TTL362 Theory of Textile Structures I
TTN110 Introduction to Textile Technology
TTP200 Design of Textile Products and Processes
TTP211 Introduction to Fibres
TTP212 Manufactured Fibre Technology
TTP221 Yarn Manufacture Laboratory
TTP222 Yarn Manufacture Laboratory - II
TTP231 Fabric Manufacture Laboratory - I
TTP232 Fabric Manufacture Laboratory - II
TTP241 Tech. of Textile Preparation and Finishing
TTP242 Technology of Textile Colouration Lab.
TTP361 Textile Testing Laboratory
TTT410 Practical Training

Departmental Electives (DE)

BEL110 Molecular Cell Biology
CHL110 Transport Phenomena
TTD310 Mini Project (TT)
TTL311 High Performance and Specialty Fibres
TTL321 Mechanics of Spinning Machinery
TTL322 Mechanics of Spinning Processes
TTL323 Process Control in Spinning
TTL324 Spinning of Man-made Fibres and Blends
TTL331 Fabric Structure and Analysis
TTL332 Computer Aided Fabric Manufacturing
TTL333 Process Control in Weaving
TTL341 Polymers and Surfactants for Textiles
TTL351 Apparel Technology
TTL352 Clothing Science
TTL363 Technical Textiles
TTL364 Intelligent and Functional Textile
TTL365 Costing and its Application in Textiles
TTL724 Textured Yarn Technology
TTL740 Sc.and Applications of Nanotech.in Textiles
TTL744 Environment Management in Textile and Allied
TTL746 Medical Textiles
TTL750 Science of Clothing Comfort
TTL752 Functional Textile Envelops
TTL762 Management of Textile Production
TTL765 Product Development
TTL773 Design of Expt. and Statistical Techniques
TTL782 Nonwoven Science and Engineering
TTP311 Simulation of Fibre Production Processes
TTR310 Professional Practices
TTS310 Independent Study
TTV301 Special Module in Yarn Manufacture
TTV302 Special Module in Fabric Manufacture
TTV303 Special Module in Textile Chemical Processing
TTV304 Special Module in Fibre Science
TTV305 Special Module in Textile Technology
TTV702 Management of Textile Business
TTD412 Major Project Part 2

Master of Technology in Textile Engineering

Programme Code: TTE

The overall credits structure

Category	PC	PE	OC	Total
Credits	42	12	06	60

Programme Core (PC)

TTD893 Major Project Part 1
TTD894 Major Project Part 2
TTL721 Theory of Yarn Structure
TTL722 Mechanics of Spinning Processes
TTL731 Theory of Fabric Structure
TTL733 Selected Topics in Fabric Manufacture
TTL763 Technical Textiles
TTL771 Electronics and Controls for Textile Industry
TTL773 Design of Experiments and Statistical Techniques
TTP761 Evaluation of Textile Materials
TTP762 Evaluation of Textile Materials

Programme Electives (PE)

TTL714 Physical Properties of Fibres
TTL723 Selected Topics in Yarn Manufacture
TTL724 Textured Yarn Technology
TTL732 Computer Aided Fabric Manufacturing
TTL750 Science of Clothing Comfort
TTL751 Apparel Engineering and Quality Control
TTL752 Functional Textiles Envelope
TTL761 Costing, Project formulation and Appraisal
TTL762 Management of Textile Production
TTL764 Process Control in Spinning and Weaving
TTL765 Product Development
TTL772 Computer Programming and Its Applications
TTL782 Nonwoven Science and Engineering
TTL830 Modeling and Simulation in Fibers Assemblies
TTL866 Functional and High Performance Textiles
TTS891 Independent Study (TTE)
TTV700 Special Module in Selected Topic

Master of Technology in Fiber Science and Technology

The overall credits structure

Category	PC	PE	OC	Total
Credits	42	12	06	60

Programme Core (PC)

TTD891 Major Project Part 1
TTD892 Major Project Part 2
TTL711 Polymer and Fibre Chemistry
TTL712 Polymer and Fibre Physics
TTL713 Technology of Melt Spun Fibres
TTL714 Physical Properties of Fibres
TTL715 Technology of Solution Spun Fibres
TTL741 Colouration of Textiles
TTP711 Polymer and Fibre Chemistry Lab
TTP712 Polymer and Fibre Physics Laboratory
TTP716 Fibre Production and Post Spinning Operation Laboratory

Programme Electives (PE)

TTV700 Special Module in Selected Topics
TTL717 Advances in Manufactured Fibres
TTL718 High Performance Fibres and Composites
TTL724 Textured Yarn Technology
TTL740 Science and Applications of Nanotechnology in Textiles
TTL742 Theory and Practice of Textile Finishing
TTL743 Principles of Colour Measurement and Communication
TTL744 Environmental Management in Textile and Allied Industries
TTL746 Medical Textiles
TTL750 Science of Clothing Comfort
TTL752 Functional Textiles Envelopes
TTL763 Technical Textile
TTL765 Product Development
TTL772 Computer Programming and Its Applications
TTL773 Design of Experiments and Statistical Techniques
TTL782 Nonwoven Science and Engineering
TTL830 Modeling and Simulation in Fibers Assemblies
TTL866 Functional and High Performance Textiles
TTS890 Independent Study (TTF)

PhD programme

Course Requirement : 6 credits for M. Tech degree students
12 credits for B. Tech / M. Sc degree students
1 mandatory course on Communication Skill

Comprehensive examination: written & oral within 1.5 years of registration

(d) Pre PhD courses offered (*in last 5 yrs*).

TTL 712 Polymer and Fibre Physics
TTL 741 Colouration of Textiles
TTP 712 Polymer and Fibre Physics Laboratory
TTL 718 High Performance Fibres and Composites
TTL740 Science and Application of Nano Technology in Textiles
TTL744 Environmental Management in Textile and Allied Industries
TTL 746 Medical Textiles
TTL750 Science of Clothing Comfort
TTL763 Technical Textile
TTL773 Design of Experiments and Statistical Techniques
TTL 830 Modeling and Simulation in Fibrous Assemblies
TTL 866 Functional and High Performance Textiles

(e) New advanced Masters / Pre-PhD courses introduced in last 5 yrs.

TTL746 Medical Textiles
TTL740 Science and Applications of Nanotechnology in Textiles
TTL750 Science of Clothing Comfort
TTL752 Functional Textiles Envelopes
TTL782 Nonwoven Science and Engineering
TTL765 Product Development
TTL830 Modeling and Simulation in Fibers Assemblies
TTL866 Functional and High Performance Textiles

(f) Overlap between courses (c) and (d) & (e), including opening latter to UG.

Some basic courses at The M. Tech level may have 20-30% overlap with B. Tech courses

(g) Seminar series (weekly/regular) held each semester (*provide list*).

Seminar presentation is common in many courses. Special lectures are held in some courses where outside professionals are invited in courses like TTR301 (Professional Practices). On an average 10-11 such course based interactions are in this course.
Besides these, seminar presentation is mandatory for all the PhD students in the department once in a year.

(h) Placement details (*as per format*).

	Prog Type	**Programme Name**	**No. of graduating students**	**No. of students selected**	**No. of non core companies that recruited students**	**No. of students in non core companies**	**No. of students not placed**
2009	B. Tech	Textile Technology	39	26	21	26	13
	M. Tech	Textile Engineering	19	7	2	2	12
		Fibre Science & Technology	11	10	1	1	1
2010	B. Tech	Textile Technology	38	30	16	19	8
	M. Tech	Textile Engineering	15	13	1	1	2
		Fibre Science & Technology	4	1	-	-	3
2011	B. Tech	Textile Technology	45	36	23	34	9
	M. Tech	Textile Engineering	25	18	2	4	7
		Fibre Science & Technology	16	13	1	4	3
2012	B. Tech	Textile Technology	48	40	26	38	10
	M. Tech	Textile Engineering	22	12	-	-	10
		Fibre Science & Technology	16	6	-	-	10
2013	B. Tech	Textile Technology	53	35	20	29	18
	M. Tech	Textile Engineering	7	6	2	3	1
		Fibre Science & Technology	15	7	-	-	8

(i) Relevance of UG and programmes to recruiters, potential and on-campus recruiters (*as per format*)

Degree	**Programme name**	**Year of graduation**	**Students employed on campus**	**Details of survey done**
B. Tech				No formal survey has been undertaken, however, informally the department faculty and T&P, in charge takes the feedback and communicated to the students as also to the faculty of the department. It may here be noted that the summer internship is supervised by the faculty members
	Textile technology	2009	39	
		2010	38	
		2011	45	
		2012	48	
		2013	53	
M. Tech				
	Fibre Science	2009	11	
		2010	4	
		2011	16	
		2012	16	
		2013	15	
M. Tech	Textile engineering	2009	19	
		2010	15	
		2011	25	
		2012	22	
		2013	7	

(j) Benchmarking of curriculum (*as per format*)

Information	Undergraduate			Graduate			Ph.D.		
	IIT Delhi	RWTH Aachen	Donghua	IIT Delhi	RWTH Aachen	Donghua	IIT Delhi	Aachen	Donghua
Total credit requirement	180	210	200	60	300	30	6 credits for M. Tech and 12 credits for M. Sc./ B. Tech	NA	20
Core credits	105	205	130	42	270	22			10
Elective credits	75	5	58	12	30	8			10
Core credits as % of total credits	58%	98%	65%	70%	90%	73%	N.A.		50%
Text books used in core courses (Yes /No)	Yes	Yes	YES	Yes	yes	YES			No
No. of assignments submitted by students	Many	3 (incl. bachelor thesis)	Many	Many	1 (master thesis)	Less			Less
No. of theory courses in core curriculum	20	33	20	7 for TE & 6 for Fibre Science	5	7	2-4	0	5
No. of Laboratory courses	12	2	4	2 for TE & 3 for Fibre Science	0	2		0	0
Thesis requirement (duration & credit)	12 months (12)	10 weeks, 15 credits	1 years		22 weeks, 30 credits	1.5 years with at least 1 paper publication	3-5 years	5 years	2.5 -5 years, and with at least 3 papers publication
Important differences with peers	Elective courses are more		Special knowledge with higher degree			High researching ability	SRC for Advice and quality monitoring		Very high researching ability

Maths requirement in Masters courses in terms of credits	NA	Math only in bachelor's degree (21 credits)	General			General			General
Ph.D. course-work requirement and typical actual course work		NA	NA		NA	NA	6 credits for M. Tech and 12 credits for M. Sc./ B. Tech	5 years full time	Yes
Ph.D. requirement of publishing a paper		NA	NA		NA	NA	N.A.	15 – 30 papers (of which 2 – 5 are peer reviewed)	Yes
Ph.D. –teaching (tutorial) requirement							Yes	NA	No.
Inter disciplinary / breadth requirements for Masters (in terms of no. of courses or credits)				6 Credits		Studying specified special courses at least 2 courses		NA	
Inter disciplinary / breadth requirements for Ph.D (in terms of no. of courses or credits)							Based on the background of the students and research area	NA	No

2. Teaching environment

2.1 Student-Teacher ratio separately and total for UG, PG, PhD (based *on gross numbers and on class size basis*)

All the faculty members are involved in teaching UG, PG, and Pre-Ph. D. courses, therefore, the data for each programme cannot truly represented by this ratio. However, the department would like to change the gross ratio to close to 10:1, by inducting more faculty in relevant areas as envisaged in our statement.

	No. of students	No. of teachers	Ratio
B. Tech	360	23	15.6
M. Tech	50		2.17
Ph. D	44		2.0
Total (Gross)	**454**		**19.74**

2.2 No. of students graduated in each programme, incl. PhD, (*data for 5 yrs*)

	2009	**2010**	**2011**	**2012**	**2013**
B. Tech	39	38	45	48	53
M. Tech					
Fibre Science	11	4	16	16	16
Textile engineering	19	16	25	22	7
Ph. D	2	4	4	6	7
Total	**71**	**62**	**90**	**92**	**83**

2.3 Student-T.A. (or student-hours/T.A.) ratio

Student: T.A= 6:1
Student - TA: 8 hours /week (Ph. D. and M. Tech. students, some bright B. Tech. students are also involved in mentoring the junior students)

2.4 No. of skilled technical staff
13

2.5 Gross laboratory space; break-up of lab space for core UG / PG teaching

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Purely research lab	UG teaching lab	PG teaching lab	Overlapping Research labs. with Teaching labs.
4350 sq. ft *	30852 sq. ft		

* Department has been allotted research space outside the textile block a total of 2580 sq, ft for Tissue Engineering (980 sq. ft.) and SMITA lab (1600 sq. ft)

2.6 Laboratory modernization performed in last 5 years for (i) UG core, (ii) PG core, (iii) elective courses (*attach data before and after modernization),*

Sl. No.	**2009-2010**	**Sl. No.**	**2010-2011**
1.	Software Geodict 2009.4 CPU Version	1.	Emersion 2x 40 KVA UPS
2.	Thermal Analyser system	2.	Mathis 2-Roll laboratory Padder horizontal/vertical
3.	Thermogravimetric analyser with high resolution	3.	Laboratory drying condensation and fixation apparatus
4.	Syris Laboratory Modular Reactor Model ATLAS	4.	Mathis Laboratory dryer with coating device
5.	Micro Tensile Tester	5.	Oxford EDS system
6.	Automatic Capillary flow Porometer with E-extended accuracy	6.	Freeze dryer systems
7.	Vedio Extensometry High Resoulution Vedio extensiometer	7.	Table mounted material testing system
8.	Water Vapour Transmission Tester	8.	Dispensing system
9.	Zetasizer Nano	9.	Rapid Prototype direct working machine with software
10.	Oxygen Permeability Tester	10.	Multiview 2000(NSOM/SPM/TI and sample scan head assembly
11.	UV Visible Spectrometer	11.	Leica Polarising optical microscope
12.	Drop shape analyser system using optical radiation	12.	Nikon Trinocolour Polarizing Microscope
13.	Porometer Macro through Porosize analyser	13.	Solver pro contact AFM/LFM/Resonant (SEM Icontact-Non contact AFM)
14.	Filter Media handling system	14.	Lab Scale Electrospinning Unit
15.	Triple Detector Array System with RI Viscometer	15.	Conformat 2 Pressure measuring system
16.	Micro Raman Spectroscopy System		
17.	Mass Spectrometer		
18.	Cryo-SEM Workstation (Rotary pumped)		

Sl. No.	2011-2012	
1.	High Voltage Plasma treater Generator	13. High speed circular Rib knitting machine
2.	Rheometer	14. Fast knit weft circular knitting machine
3.	Density Gradient columns	15. Automatic tensile and shear tester (KATO)
4.	FT NMR systems	16. Fabrication of instrument for measurement of electrical conductivity of textile fabrics
5.	Environmental Scanning Electron Microscope	17. Fabrication of instrument for testing compression shear and bending properties of carpets.
6.	EVO 18 Scanning Electron Microscope	**2012-13**
7.	Small Angle X-ray Scattering system	1. Plasma treated Generator
8.	Mathis Beaker dyeing apparatus	2. Daelim Starlet Lab IR Dyeing machine
9.	Clean Air Balancing Unit	3. Motic Trinocular Research Polarizing Microscope
10.	Magnetic Levitated Vortex dyeing machine	4. Fabric UV Transmittance Analyser
11.	MMT Moisture Management Tester	5. Tensiometer
12,	Laboratory Nonwoven line (DILO Germany)	6. Spencers Rotary Microtome
		7. Laboratory Scale Melt Spinning machine

*All labs are used for UG,PG and elective courses.

2.7 Course files for each course for last 5 years
Each faculty maintains his/her own course file for the courses they are teaching

We do not have course file as of now. We have lecture outlines for various courses. This will be expanded and course files will be made. However, efforts are being made to start the process.

2.8 Study materials (monographs, notes, books, videos, web-based materials, etc.) prepared, course-wise

Notes	TTL715, TTL731,TTL773, TTL782, TTL362, TTL363, TTL746, TTL231, TTL750,TTL361, TTL711,TTL321, TTL742.
Books	TTL321
Laboratory Manual	TTP711, TTP241, TTP242, TTP232, TTP761, TTP762, TTP761, TTP762,TTP712
Videos	TTL 321
Web-Based Materials	TTL311, TTL221
NPTEL courses	14 NPTEL courses (details are given in 6. g)

2.9 Research and Innovations in teaching-learning processes

1. Working professional are regularly invited to deliver lecture and interact with the undergraduate students in courses or in formal seminars.
2. Design of textile products and processes through a open Hands-on course to inculcate creative thinking among the students who are given full freedom to conceive a product idea and realize it by the end of the semester. All the products are displayed on a specific day and experts are called for evaluation.
3. Facilitating group discussions in the classes to solve open ended problems.
4. Students are encouraged to surf open ended / specialized software and use these in problem solving.
5. Use of videos and animations in lectures and labs. Some of these are developed in the department itself.
6. Visualizes and LCD projectors are regularly used by faculty members and students for presentations.
7. Online testing and evaluation in some courses.

2.10 No. of students (UG and PG separately) who have spent at least a semester at another university/institute (overseas or Indian).

Program	2009	2010	2011	2012	2013
UG	2	2	2	2	3
PG	2	2	2	1	-

Compile the numbers

2.11 No. of students from overseas universities who have taken classes, done project work or internship, UG & PG separately, in the department.

Program	2009	2010	2011	2012	2013
UG					
PG		2 (France, Germany)	1 (Italy)	2 (Germany)	2 (MIT, TU Liberec)

2.12 Course feedback.

Students give their feedback about the courses being taught through online blind review process. The feedback is reviewed by the Dean Academic and each semester few teachers are awarded based on the feedback. Prof. Apurba Das has been awarded as best teacher for large class for second semester 2012-13.

2010-2011 Sem II

Number of Courses: UG: 5 PG: 14

	Overall	**UG**	**PG**
Average class size	27.05	51.80	18.21
Maximum scores	4.95	4.01	4,95
Minimum scores	3.15	3.15	3.30
Average scores	3.98	3.50	4.16

2011-2012 Sem I

Number of Courses: UG: 9 PG: 15

	Overall	**UG**	**PG**
Average class size	33.88	54.33	21.60
Maximum scores	4.88	4.35	4.88
Minimum scores	2.46	2.46	3.86
Average scores	4.10	3.41	4.52

2011-2012 Sem II

Number of Courses: UG: 6 PG: 15

	Overall	**UG**	**PG**
Average class size	36.05	73.00	21.27
Maximum scores	4.85	4.38	4.85
Minimum scores	2.35	2.35	2.62
Average scores	3.89	3.40	4.08

2012-2013 Sem I

Number of Courses: UG: 9 PG: 15

	Overall	**UG**	**PG**
Average class size	44.83	80.89	21.64
Maximum scores	4.86	4.24	4.86
Minimum scores	2.83	2.83	3.93
Average scores	4.03	3.57	4.34

2012-2013 Sem II

Number of Courses: UG: 6 PG: 14

	Overall	**UG**	**PG**
Average class size	42.25	91.83	21.00
Maximum scores	4.58	4.36	4.58
Minimum scores	3.13	3.13	3.60
Average scores	4.03	3.68	4.18

2013-2014 Sem I

Number of Courses: UG: 9 PG: 14

	Overall	**UG**	**PG**
Average class size	48.35	86.22	24.00
Maximum scores	4.90	4.03	4.90
Minimum scores	2.42	2.42	3.66
Average scores	4.08	3.71	4.32

2.13 Industry experts who have delivered lecture(s), seminars, discussions as part of a core/elective course – UG and PG separately.
On an average 8-10 persons from industry come to interact with students in formal classes, some of the representative names are

Mr. Sachit Jain	(Vardhman Group)
Dr. Ashwan Kapur	(Uniproducts)
Dr. S. K. Chaudhury	(Wool Mark compnay)
Mr. S. K. Bhatia	(Indo Rama Synthetics Ltd.)
Mr. Prashant Saxena	(Consultant)
Mr. Prashant Agrawal	(Wazir advisers)
Mr. Salil Pandey	(Vmock)
Mr. Harpal Singh Sagoo	(Instacon)
Mr. Raveender Sharma	(NTC)
Mr. Ankur Kothari	(BCG)
Mr. Ankur Puri	(Mc Kenzie)

2.14 Industry exposure to students – course-related visits to factories, sites, industry exhibitions, field trips, etc. – UG and PG separately.

B. Tech Students undergo mandatory internship in an industry for 50 working days. PG internship is optional.
Textile Engineering Society organizes visit to the industry such as:

- Uniproducts, Bhiwadi
- Alps Industries,
- Celestial Knits Pvt. Ltd. Noida
- SL Cotsyn Kanpur
- IKEA Gurgaon,
- ITC Ltd. Gurgaon,
- Rawat Engineering Pvt. Ltd. Dehradun
- Garment Fair at Delhi as a part of 'Garment Technology course'.
- Visit to plastindia

3. Research

3.1 No. of Masters and Ph.D. students supported - (i) by Institute Assistantship, (ii) on sponsored projects/consultancies, (iii) others sources and (iv) sponsored by external

Program	**Institute assistantship**	**Sponsored projects/consultancies**	**Other sources (PT)**	**sponsored by external**
Masters	144	1	1	3
Ph. D	28	7	8	1

3.2 No. of Ph.D.s enrolled, graduated per faculty for last 5 years

	2009	**2010**	**2011**	**2012**	**2013**	**Cumulative**
Ph. D. Enrolled	10	8	5	6	13	42
Ph. D Graduated	2	4	4	6	7	23

* The above data is total for the whole department.

3.3 Areas of research (e.g. areas listed in Prospectus, and others) by (i) Volume (quantifiable parameters), (ii) Breadth, and (iii) Years these have been research areas (*as per format*)

I. Textile Products and processes
II. Technical Textiles
III. Medical Textiles & Tissue Engineering
IV. Advanced Materials for textile applications
V. Textile Instrumentation

3.4 Publications per faculty (average per year for last five years) in academic journals.

Year	Journal*	Conference
2009	3.37	3.81
2010	4.56	4.65
2011	4.11	2.61
2012	4.80	3.22
2013	4.77	5.77

*Joint publications have been counted as one.

3.5 Publications (journal and conference) total and per (a) Ph.D. student, (b) Masters student, (c) UG student.

Publications from Ph.D, M.Tech and B. Tech during (1.1.2009-31.12.2013)

Sl. No.	Name of faculty	Ph. D	M. Tech	B. Tech	Others	Total
1	Prof. R. Chattopadhyay	20	2	0	1	23
2	Prof. B. L. Deopura	9	1	0	1	11
3	Prof. V. K. Kothari	29	9	0	1	39
4	Prof. S. M. Ishtiaque	25	12	1	2	40
5	Prof. Kushal Sen	10	1	0	0	11
6	Prof. A. K. Agrawal	77	15	1	12	105
7	Prof. B. K. Behera	19	10	0	10	39
8	Prof. B. Gupta	42	1	0	5	48
9	Prof. R. Alagirusamy	34	3	1	0	38
10	Prof. R. S. Rengasamy	11	7	0	6	24
11	Prof. Manjeet Jassal	70	15	1	12	98
12	Prof. Mangla Joshi	29	3	1	5	38
13	Prof. Deepti Gupta	10	2	1	4	17
14	Prof. Apurba Das	53	27	8	8	96
15	Dr A. Majumdar	9	7	1	10	27
16	Dr. Dipayan Das	32	21	0	7	60
17	Dr Sourabh Ghosh	7	2	-	3	12
18	Dr B. S. Butola	6	7		2	15
19	Dr. Amit Rawal	7	7	3	11	28
20	Dr. S. Mukhopadhyay	1	3	3	0	7
21	Dr Bhanu Nandan	7	6	0	5	18
22	Dr Rajiv Srivastava	03	01	0	0	05

3.6 Best papers in last 5 years: (i) Individual best 3, (ii) department/centre best 10; and brief justifications.

(i) Individual best

Dr. R. Chattopadhyay

- R. Chattopadhyay and Mohit Raina "Fibre breakage during drafting on ring frame" Journal of the Textile Institute, 2013
- R. Chattopadhyay, D. Gupta & M. Bera (2012): Effect of input tension of inlay yarn on the characteristics of knitted circular stretch fabrics and pressure generation, Journal of the Textile Institute, 2012
- D Gupta, R. Chattopadhyay & M Bera; "Comfort properties of pressure garments in extended state", Indian Journal of fibre and Textile Research 36, 2011, 415-421

Dr. A. K. Agrawaal

- Sandip Basu, Ashwini K. Agrawal, Manjeet Jassal, Concept of Minimum Electrospinning Voltage (MEV) in Electrospinning of Polyacrylonitrile DMF system, Journal of Applied Polymer Science (2011), 122(2), 856-866.
  JustificationThis paper, for the first time, has reported the concept of Minimum electropsinning voltage, which is able to correlate the power spent in the system to the work done in the spinning system based on basic scientific principles.
- Santhosh K Garapati, Anasuya Sahoo, Ashwini K. Agarwal, Manjeet Jassal, Phase behavior and mechanism of formation of protofiber morphology of solution spun poly(acrylonitrile) copolymers in DMF-water system, Journal of Applied Polymer Science (2011), 119(2), 837-854.
  Justification: The paper, for the first time, reported the thermodynamic explanation of obtaining dense and void free protofibers in a solution spinning system. In previous paper such characteristics were usually reported to be based on kinetic reasons.
- Kartick K Samanta, Manjeet Jassal and Ashwini K Agrawal, Study of hydrophobic finishing of cellulosic substrate using He/1,3- butadiene plasma at atmospheric pressure, *Surface and Coating Technology*, (2012) 213, 65-76.
  Justification: This paper reports possibility of carrying out controlled reaction chemistry at atmospheric pressure glow plasma. At suitable conditions, the precursor was found to react covalently with the substrate to yield wash durable functionality. Usually in the literature plasma modifications are carried out to physically deposit condensates of precursors, which are not wash resistant.

Dr. Bhuvnesh Gupta

- R. Agarwal, M. S. Alam, B. Gupta: Preparation of curcumin loaded poly(vinyl alcohol)-poly(ethylene oxide)-carboxymethyl cellulose membranes for wound care application' Journal of Biomaterials and Tissue Engineering, J. Biomater. Tissue Eng. 2013, 3, 273-283.
  B. Gupta, D. Gautam, S. Anjum, S Saxena, A.R. Ray, A Kapil, Radiation Synthesis of Nanosilver nanohydrogels of Polymethacrylic acid.Rad Phy Chem. In Press (2013).
- A Novel Route to Polycaprolactone Scaffold for Vascular Tissue Engineering Shamayita Patra, Murielle Remy, Alok R. Ray, Brigitte Brouillaud, Joelle Amedee, Bhuvanesh Gupta, and Baurence Bordenave J. Biomater. Tissue Eng. 3, 289-299 (2013)

Prof. R. Alagirusamy

- B. Kumar, A. Das and R. Alagirusamy, Study of the effect of composition and construction of material on sub-bandage pressure during dynamic loading of a limb in vitro, Biorheology 50 (1-2), 2013, pp. 83-94.
  Justification: This paper was published after considerable work on selecting the composition and construction of material for the compression bandages in order to get the optimized sub-bandage pressure during dynamic loading of a limb in vitro. This information will be useful for the medical practioners dealing with compression bandages for mobile patients.
- Sohel Rana, R. Alagirusamy and Mangala Joshi, "Mechanical Behavior of Carbon Nanofiber Reinforced Epoxy Composites", 2010, Journal of Applied Polymer Science, Vol. 118, Issue 4, 2276–2283.
  Justification: In this paper mechanical properties of 3 Phase composites with carbon fabric, carbon nano fibres and epoxy resin are provided and analysed. Little information is available on 3 phase carbon composites, which exhibits very interesting properties.
- Naveen V Padaki, R. Alagirusamy, B.L. Deopura and R. Fangueiro "Studies on Preform Properties of Multilayer Interlocked Woven Structures Using Fabric Geometrical Factors" Journal of Industrial Textiles, Vol. 39, No. 4—April 2010.
  Justification: Multilayer Interlocked and 3D woven preforms are becoming very important in the area of composite manufacturing as they provide important properties like high damage tolerance and impact resistance. In this paper, an attempt made to understand and improve the prefom properties using the fabric geometrical factors.

Dr. Manjeet Jassal

- Priyanka Dey, Virendra Rajora, Manjeet Jassal and A.K. agrawal, A novel route for synthesis of temperature responsive nanoparticles, Journal of Applied polymer Science, (2011),120(4), 335-344.
- M Palanikkumaran, Kishor K Gupta, Ashwini K Agrawal, Manjeet Jassal, HighlyStable Hexamethylolmelamine Microcapsules containing n-Octadecane Prepared by In situ Encapsulation, J. Appl. Polym. Science, 2009, Vol. 114, 2997–3002.
- Sukrut Ozarkar, Manjeet Jassal, and Ashwini K. Agrawal, Simple and fast method for purifying single-walled carbon nanotubes, Indian Journal of Fibre & Textile Research, Vol. 34, December 2009, pp. 374-376.

Dr. R. S. Rengasamy

- R. S. Rengasamy, Dipayan Das and C. Praba karan, Study of oil sorption behaviour of filled and structured fiber assemblies made from polypropylene, kapok and milkweed fibers, J. Hazard. Mat. 2011, 186 526-532.
  This paper is the result of efforts made to develop sustainable material for oil cleanup application (both film and oil emulsion in oil-water waste)
- R. S. Rengasamy, Vijay S. Bele, V. K. Kothari and Rajesh Khanna, Liquid sorption behaviour of nonwoven, J. Textile Inst., 2011 102 1-12.
  A comprehensive analysis of wicking and liquid spreading on various nonwovens are reported along based the concept of equivalent pore sized based on modified Washburn equation.
- Chidambaram Ramesh kumar, R. S. Rengasamy and N. Anbumani, Studies on Polyester/Waste silk core spun yarns and fabrics, *J. Industrial Textiles 2009 39 191-203*. This work is related to utilizing silk waste that occurs during reeling. The paper

has demonstrated that cost effective yet value added products can be made from polyester/silk yarns

Dr. Deepti Gupta

- Gupta D, Agrawal A, Chaudhary H, Gulrajani M, Gupta C, Cleaner process for extraction of sericin using IR, *Journal of Cleaner Production* (2013) 52,488-494.
  Journal of cleaner production is a very high impact factor (3.85) journal.
  The paper deals with use of IR energy for extraction of sericin from silk. the proposed process makes use of less water, less time and less energy to extract complete sericin from silk. The process can lead to development of commercial process for use of IR in textile processing thus leading to tremendous savings in resources while reducing the pollution load.
- 2. Ahmed Kerkeni, Nemeshwaree Behary, Anne Perwuelz and Deepti Gupta, Dyeing of woven polyester fabric with curcumin: effect of dye concentrations and surface pre-activation using air atmospheric plasma and ultraviolet excimer treatment, 2012, Color.Tech., 128, 223-229.
  This research was a collaborative research project where detail work was done on functionalisation of polyester with UV excimer lamp and then a natural dye with medicinal properties was applied for a durable finish.
- Rajni Singh, Astha Jain, Shikha Panwar, Deepti Gupta and SK Khare, Antimicrobial activity of some natural dyes, Dyes and Pigments, Vol. 66 (2) Aug. 2005, 99-102.

  This was a pioneering work wherein the antimicrobial properties of natural dyes were scientifically tested and reported for the first time.

Dr. Bhanu Nandan

- Synthesis of hollow silica nanostructures using functional hairy polymer nanofibers as templates, S. Sanwaria, Jit Pal, R. Srivastava, Petr Formanek, M. Stamm, A. Horechyy, Bhanu Nandan RSC Advances, 3, 24009, 2013 A Step-Wise Approach for Dual Nanoparticle Patterning via Block Copolymer Self-Assembly, A. Horechyy, Bhanu Nandan, N. E. Zafeiropoulos, P. Formanek, U. Oertel, N. C. Bigall, A. Eychmüller, M. Stamm Advanced Functional Materials, 23, 483, 2013Hairy Polymer Nanofibers via Self-Assembly of Block Copolymers, Jit Pal, S. Sanwaria, R. Srivastava, Bhanu Nandan, A. Horechyy, M. Stamm, H.-L. Chen Journal of Materials Chemistry, 22, 25102, 2012

Dr. Dipayan Das

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- Effect of 3D fiber orientation distribution on transverse permeability of fibrous porous media, Pradhan, A. K., Das, D., Chattopadhyay, R., and Singh, S. N., Powder Technology 221, 101-104, 2012
- Study of oil sorption behavior of filled and structured fiber assemblies made from polypropylene, kapok, and milkweed fibers, Rengasamy, R. S., Das, D., Prabakaran, C., Journal of Hazardous Materials, 186(1), 526-532, 2011

Dr. Sourabh Ghosh

- The role of 3D structure and protein conformation on the innate and adaptive immune responses to silk-based biomaterials, M Bhattacharjee, E Schultz-Thater, E Trella, S

Miot, S Das, M Loparic, AR Ray, I Martin, GC Spagnoli, S Ghosh, Biomaterials, 2013, 34, 8161-8171
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- Enhanced redifferentiation of chondrocytes on microperiodic silk-gelatin scaffolds: toward tailor-made tissue engineering, S Das, F Pati, S Chameettachal, S Pahwa, AR Ray, S Dhara, S Ghosh, Biomacromolecules, 2013, 14, 311-321
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  Impact factor: 5.37, this is the first report on use of tissue engineering to develop in vitro human disease model. It has been highlighted as cover page story in the top journal in the field of Tissue engineering

Dr. Abhijit Majumdar

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Dr. Rajiv Srivastava

- Pal J., Kankariya N., Sanwaria S., Nandan B. & Srivastava Rajiv K. "Control on molecular weight reduction of poly(ε-caprolactone) during melt spinning – a way to produce high strength biodegradable fibers", *Material Science and Engineering* - C, 2013, 33, 4213-4220
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Dr. Samrat Mukhopadhyay

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- S.Mukhopadhyay, D Annamalai, R Srikanta, Use of coir fibres for heat insulation, Journal of Natural Fibres, Journal of Natural Fibers, Volume 8, Issue 1, 2011 Taylor and Francis, London

Dr. B. S. Butola

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Best papers of Textile Department

1. Abhijit Majumdar , Bhupendra Singh Butola & Ankita Srivastava, Development of soft composite materials with improved impact resistance using Kevlar fabric and nano-silica based shear thickening fluid, 54 (2014) 195-200.
2. B.P. Dash, B K Behera, Rajesh Mishra & Jiri Militky, Modeling of internal geometry of 3D woven fabrics by computation method for structural composites, Journal of the Textile Institute, Vol 104, Issue 3, Pages- 312-321, 2013
3. Gupta D, Agrawal A, Chaudhary H, Gulrajani M, Gupta C, Cleaner process for extraction of sericin using IR, Journal of Cleaner Production (2013) 52,488-494.
4. Ishtiaque S M, Singh S N, Das A, Mittal S, Dave V "Optimisation of fluid flow phenomena inside transport duct of a DREF-III" J Text Inst, 101 (10) (2010)
5. Jit Pal, S. Sanwaria, R. Srivastava, Bhanu Nandan, A. Horechyy, M. Stamm, H.-L. Chen Hairy Polymer Nanofibers via Self-Assembly of Block Copolymers , Journal of Materials Chemistry, 22, 25102, 201
6. M Bhattacharjee, E Schultz-Thater, E Trella, S Miot, S Das, M Loparic, AR Ray, I Martin, GC Spagnoli, S Ghosh, The role of 3D structure and protein conformation on the innate and adaptive immune responses to silk-based biomaterials, Biomaterials, 2013, 34, 8161-8171.
7. Pal J., Kankariya N., Sanwaria S., Nandan B. & Srivastava Rajiv K. "Control on molecular weight reduction of poly(ε-caprolactone) during melt spinning – a way to produce high strength biodegradable fibers", Material Science and Engineering - C, 2013, 33, 4213-4220
8. Pradhan, A. K., Das, D., Chattopadhyay, R., and Singh, S. N., Effect of 3D fiber orientation distribution on transverse permeability of fibrous porous media, Powder Technology 221, 101-104, 2012
9. Priyanka Dey, Virendra Rajora, Manjeet Jassal and A.K. agrawal, A novel route for synthesis of temperature responsive nanoparticles, Journal of Applied polymer Science, (2011),120(4), 335-344.
10. Rawal. A, Saraswat, H and Kumar. R. (2013), Tensile Response of Tubular Braids with an Elastic Core, Composites: Part A, Vol. 47, pp.150-155.
11. S.Mukhopadhyay, D Annamalai, R Srikanta, Use of coir fibres for heat insulation, Journal of Natural Fibres, Journal of Natural Fibers, Volume 8, Issue 1, 2011 Taylor and Francais, London
12. R. Chattopadhyay and Mohit Raina "Fibre breakage during drafting on ring frame" Journal of the Textile Institute, 2013

13. Sandip Basu, Ashwini K. Agrawal, Manjeet Jassal, Concept of Minimum Electrospinning Voltage (MEV) in Electrospinning of Polyacrylonitrile DMF system, J. Appl. Polym. Science, (2011), 122(2), 856-866.
14. R. Agarwal, M. S. Alam, B. Gupta: Preparation of curcumin loaded poly(vinyl alcohol)-poly(ethylene oxide)-carboxymethyl cellulose membranes for wound care application' Journal of Biomaterials and Tissue Engineering, J. Biomater. Tissue Eng. 2013, 3, 273-283.
15. M. Manshahia and A. Das, Moisture Management in High Active Sportswear, Accepted in Fibers and Polymers on 12 December, 2013, Accepted in Fibers & Polymers.
16. Ankita Srivastava, Abhijit Majumdar, Bhupendra Singh Butola, An analysis of deformation and energy absorption modes of shear thickening fluid treated Kevlar fabrics as soft body armour materials, Materials and Design, 51, 148-153, 2013.

3.7 Average citation per department/center.
H. Index 17
i-10 Index 25

3.8 Changes, modifications, etc. done to improve the quality of (i) M. Tech., and (ii) Ph.D. graduates.

- New facilities have been created in the labs
- New courses in cutting edge areas.

TTL746 : Medical Textiles 3-0-0 3
TTL740 : Science and Applications of Nanotechnology in Textiles 3-0-0
TTL750: Science of Clothing Comfort 3-0-0 3
TTL752: Functional Textiles Envelopes 2-0-2 3
TTL782: Nonwoven Science and Engineering 3-0-0 3
TTL765: Product Development 2-1-0 3
TTL830: Modeling and Simulation in Fibrous Assemblies 2-0-2 3

- Training of students on new instruments
- Students are encouraged to present national and international conferences through project funds.
- Student participation in organizing the conferences in the department.
- New advanced topics have been added in many PG courses
- New practical experiments have been designed for PG students
- Institute financially supports PhD students for presenting papers in National and International Conferences
- Strict selection process is followed at the entry level for M. Tech. and PhD admissions.
- Formal presentation of the work in front of SRC members has been made mandatory for PhD students once a year.
- Writing of review papers is initiated by respective supervisors for improving communication skills
- Students assistance to faculty in conducting lab and tutorial classes helps in improving confidence and convincing power of students.
- Through MoUs and joint research projects with overseas universities, students are encouraged to do joint research work.

- Technical University of Liberec, Czech Liberec
- Shinshu University, Japan
- University of Dar es Salaam, Tanzania
- Manchester Metropolitan University, U. K.
- Univ. of Mauritius

3.9 Sponsored projects - (i) individually, (ii) with another faculty of the group/section of the department, (iii) with another faculty of the department but from another group/section of the department (iv) with another faculty of another dept/center.

Year	Individually	With another faculty of the group/section of the department	With another faculty of the department but from another group/section of the department	With another faculty of another dept/center.
2009	5	7	1	3
2010	1	6	-	1
2011	-	2	-	1
2012	2	5	3	1
2013	1	6	1	3
TOTAL	**9**	**26**	**5**	**9**

3.10 Industry consultancies

Year	No. of industry consultancies	
	IRD	FITT
2009	8	1
2010	9	1
2011	6	4
2012	5	1
2013	2	2

3.11 New areas of research which are different from the faculty's PhD thesis area.

Sl. No.	Name of the faculty	New research area
1	Ashiwini K. Agarwal	Stimuli sensitive textile materials (smart & intelligent textile), textile for thermal storage (Phase change materials), Atmospheric pressure glow plasma technology, Simulation of fibre forming processes, Nanofinishes, Nanofibers-organic/inorganic by electrospinning, Composite fibers (nanocomposites), RAFT polymerization, Coated textiles for technical applications, Burning behaviour of military clothing
2	R. Alagirusamy	Textile Instrument Development, Yarn Structure and Mechanics, Electrotextiles, Protective textiles, Nonwovens, Textile Reinforced Concrete
3	B. K. Behera	Design and manufacturing of Textile structural composites, 3D weaving and Profiled Woven structures, Woven spacer fabrics and their composites, Protective Clothing, Modeling and Simulation of Textile structures, Fabric Hand and Comfort,

		Textile Sizing
4	Bhuvnesh Gupta	Polymeric Biomaterials, Tissue Engineering, Membrane technology, Environment Protection
5	B S Butola	Enzyme applications
6	R. Chattopadhyay	Pressure garments, Textile instrumentation
7	Apurba Das	Clothing Comfort, Instrument Development, Yarn Structure and Mechanics, Technical Textiles ,Compression bandage, Filter fabrics, Electromagnetic shielding, Cut-resistant fabric, Nonwovens, Electrotextiles, Fire Protective Clothing
8	Dipayan Das	Nonwovens, composites
9	B.L Deopura	Uni-polymer composites
10	Sourabh Ghosh	Tissue engineering, Silk based biomaterials
11	Deepti Gupta	Surface functionalization of textiles, Development of bio material based finishes for multifunctionality, Anthropometry and body sizing, Performance clothing
12	S. M. Ishtiaque	Machine design, Textile instrumentation
13	Manjeet Jassal	Synthesis of Specialty and innovative polymeric materials for Textile applications, Smart textiles, Nanomaterials, Electrospinning and nanomaterial reinforced composites
14	Mangala Joshi	Nano Science & Technology, Nano composites
15	V. K. Kothari	Clothing comfort, technical textiles
16	Abhijit Majumdar	Materials for soft body armour using shear thickening fluids,
17	Samrat Mukhopadhyay	Natural fiber composites, Non-destructive testing of composite materials, Lightweight Sandwiched structures
18	Amit Rawal	Nonwovens, Braids, Super-hydrophobic nonwovens mat
19	R. Rengasamy	Mechanics of yarn structures, Hairiness reduction of spun yarns using air-jets, Garment technology, Sewing dynamics, Pucker evaluation, Clothing comfort, Wetting and wicking in fibrous materials, Sound absorption by nonwovens, Oil spill removal by sustainable fibrous materials, Nonwovens for drainage applications
20	Bhanu Nandan	Functional Nanofibres Self-assembly in soft materials Polymer properties under nano-confinement
21	Kushal Sen	Electro-conductive textiles, Micro encapsulation
22	Rajiv Srivastava	Polymerization methods: Water based polymerizations, synthesis of novel monomers and cross-linkers suitable for aqueous polymerization Fiber science: Emulsion and suspension electrospinning, melt spinning and fiber properties enhancement Scaffold fabrications methods: in-situ development of porous 3D scaffolds during polymerization, solvent free-single step methods

3.12 Methodology for (i) identifying obsolescence in research areas, and (ii) identification of new areas for future research.

- Through industrial interaction
- Thrust area identified by funding agencies like DST, DBT, DRDO etc.
- Through the publications
- Through interests of the students
- Based on national importance and social relevance

3.13 Number of large interdisciplinary projects (within department's areas, and across the institute).

Year	Within department's areas	Across the institute
2009	3	1
2010	2	-
2011	-	-
2012	4	1
2013	4	1

Note: Only Large interdisciplinary projects ≥ Rs. 50,00,000

4. Innovation, Design and Development

4.1 No. of students who have been funded for innovating (TePP, PRISM, etc.)

SURA 3

4.2 Technology developed (*give list and brief information*).

1. Technology for application of sericin on textiles: Sericin is a biomaterial having several special properties such as moisture retention, skin rejuvenation etc. Sericin treated textiles have been developed which show higher smoothness and good antioxidant properties thus making them suitable as cosmeto textiles.
2. Technology for dyeing of carpet wool with natural dyes: Technology for dyeing of wool with natural dyes was developed and then transferred to carpet manufacturers across the country including Bhadohi, Mirzapur, Jaipur, Srinagar (Kashmir) and Sikkim.
3. Technology for extraction of sericin using IR radiation: Silk was degummed using an IR assisted aqueous extraction method. The quantity of sericin obtained was much higher as compared to that obtained by the traditional HTHP method. The quality of sericin obtained was also found to be superior as evaluated by UV, IR,CD and fluorescence spectra.
4. Instrument for measuring fabric feel by nozzle extraction: The independent computerized instrument is able to measure the fabric hand in terms of extraction force as well as the radial force exerted by the fabrics while extracting through a nozzle.
5. Instrument for measuring vertical and in-plane wicking behavior of fabrics: Fabric vertical and in-plane wicking tester has been designed and developed based on capacitance principle.
6. Instrument for measuring the internal pressure of bandage: A computerized instrument has been designed and developed for measuring the internal pressure of medical bandage in real time condition.

7. Microclimate simulator cum moisture vapour transmission tester: This instrument can measure the microclimate conditions at different climatic conditions for different fabrics. Moisture vapour transmission can also be measured by this instrument.
8. Instrument for measuring fabric hairiness by image processing: An instrument for measuring fabric hairiness based of image processing technique has been designed and developed.
9. Design and development of computer controlled new drafting system: to produce multi-colour pattern blending to get fancy effect in garment and made-ups
10. Instrument for measuring fibre openness by image processing: An instrument for measuring fibre openness based on image processing technique has been designed and developed.
11. Fabric friction cum surface roughness tester: The computerized instrument measures the static and kinetic frictional characteristics of fabric (fabric-to-fabric and fabric-to-other surface) and also the surface roughness of fabrics.
12. Computerized air filtration tester: Developed a computerized air filtration tester based on laser based particle counter.
13. Air filtration tester: The instrument is able to measure all the filtration related parameters (e.g. filtration efficiency, pressure drop, volumetric flow rate, face velocity of air, up-steam and down-stream concentration of dust particles, cleaning efficiency and air permeability) of filter fabrics under heavy dust loading condition. The instrument is able to produce repeatable results.
14. Cut resistance tester: The instrument is designed and developed to measure the cut resistance of the fabrics in terms of (i) the load required to make a cut in the fabric in a single stroke, and (ii) The distance traveled by the mandrel assembly to cut the fabric for any applied load on the fabric. We have filed patent for this invention.
15. Draftometer: This computer controlled instrument is able to measure the drafting force (force required to draft) of sliver or roving under dynamic condition. We have already got patent for this invention.
16. Instrument for measuring yarn structure under different extension: With the help of this instrument one can study the change in the internal structure of yarn under different strain level.
17. 3-D Weaving technology for Carbon-Carbon Composites: A complete system of 3-D weaving was developed for making Carbon-Carbon Composites to be used in defense application for Advanced Systems Laboratory, DRDO. This technology combines multiple layers of woven layers and stuffer yarn layers in the loom itself for a total preform thickness of 50mm.
18. Development of commingling jets for hybrid yarns: For thermoplastic composites, hybrid yarns having thoroughly mixed high performance filaments and matrix forming filaments are very useful in making good quality composites. Commingling jets which can provide intimate mixing of these two different types of filaments are developed using fluid dynamics models.
19. Instrument for measuring the Slash Resistance of Fabrics: A computerized instrument has been designed and developed for measuring the slash resistance of fabrics, which gives idea about how much resistance/protection that the fabric will provide when someone slashes a person with knife.
20. Remote triggered auto carpet testing equipment**:** Fully computerized instrument measures the compressive , linear and , rotational resilience
21. Remote triggered auto electrical conductivity tester: Fully computerized instrument , measures the surface, volume resistance as also the V-I characteristics and temperature rise as a result of current flow.
22. Development of abrasive fabrics
23. Nanosilver nano hydrogel product as Antimicrobial coating

24. Development of Perfluorosulfonic acid surfactant system
25. Development of Arsenic separation kit for drinking water
26. In-situ fabrication of porous 3D film scaffolds during ring-opening polymerization of lactones and lactides – a single step solvent free process
27. Air-vortex nozzles were developed for reducing hairiness of spun yarns during ring spinning and winding.
28. Air-laid nonwoven technology was developed to process difficult natural fibers into webs (sorbent pads and filters) for oil removal applications (oil in film and emulsion forms from oil-water waste.
29. Fabric friction tester (fabric to fabric and fabric to metal) was developed at a cost of Rs. 1 lakh, whereas the imported instrument cost Rs 25 lakhs.
30. Yarn to yarn and yarn to metal friction tester was developed to measure friction from boundary to hydrodynamic regions.
31. In-plane wicking tester for woven, nonwoven fabrics was developed to test the absorption rate, absorption capacity and liquid spreading behavior.
32. Impedance tubes were developed to measure sound absorption coefficients of textile materials under wide frequency range.
33. Instrument was developed to measure dynamic sewing tension on needle thread on single needle lock stitching machine with respect to sewing cycle.
34. A set up to measure weavability of yarns and yarn breakage during winding/warping was developed to be attached to CTT tester that simulates movement of yarns during post spinning operations.
35. Warp sizing materials for nylon filament beam
36. Dyeing retardant
37. Softener auxiliary
38. Encapsulated Phase change materials- 2Nos technologies
39. Inorganic phase change materials for buildings and food storage
40. Electrospinning pilot machine for commercial production of nanofibers for automotive filters
41. Antimicrobial nanofinish
42. Self cleaning nanofinish
43. F-free hydrophobic nanofinish
44. Cut resistant nanofinish
45. Technology for recovery of CL from nylon distallation tower waste
46. Technology of conversion of nylon oligomeric waste into melt adhesives
47. Technology for elecrostatic dyeing of natual and synthetic textile materials
48. Low GSM coated textile for cooler interiors
49. Low GSM coated textile for FR application
50. Low GSM coated textile for easy cleaning
51. Optical fibres with high clarity
52. Acid dyeable acrylic fibres
53. Shear reversible nanogels
54. Paper laminates using bhindi fibres
55. Transparent scaffolds for ocular implants
56. Opto-electronic based fabric defect analyzing system
57. Electronic jacquard kit for handloom and conventional power loom
58. Image Processing Based Drape Meter.
59. Image Processing Based Piling Tester.
60. Image processing based Wrinkle Tester
61. Fabric Appearance Tester
62. Hank Sizing Machine
63. Cold sizing System

64. Parachute defect Analyser
65. Air bag Combing Tester
66. Blood penetration (Barrier) Tester
67. Digital Dust Analyzer
68. 3D weaving systems
69. Spacer weaving systems
70. Weaving of Profiled fabric
71. System to develop Double leno fabric for Aerostat

4.3 Technology transferred (*give list and brief information*).

Sl. No.	Technology transferred	Faculty involved
1	Pilling Tester based on Digital Image processing	Prof B K Behera
2	Drape Meter Based on Digital Image Processing	Dr B K Behera
3	A Process for the preparation of Polymeric Materials or Composites and(2) A Process for preparation of a composite polymer sheet and sheet thereof	Prof. B. L. Deopura.
4	An apparatus for measuring fabric hand value	Dr. Apurba Das
5	In-Plane wicking measurement system	Prof. Apurba Das
6	Warp sizing materials for nylon filament beam	
7	Dyeing retardant	A K Agrawal
8	Softener auxillary	A K Agrawal
9	Antimicrobial nanofinish	A K Agrawal Manjeet Jassal
10	Self-cleaning nanofinish	A K Agrawal Manjeet Jassal
11	Low GSM coated textile for cooler interiors	A K Agrawal Manjeet Jassal
12	Low GSM coated textile for FR application	A K Agrawal Manjeet Jassal
13	Low GSM coated textile for easy cleaning	A K Agrawal Manjeet Jassal
14	Acid dyeable acrylic fibres	A K Agrawal Manjeet Jassal
15	Transparent scaffolds for ocular implants	A K Agrawal Manjeet Jassal
16	Development of abrasive fabrics	R. Chattopadhyay & Mangla Joshi

4.4 Number of patents filed and patent granted as a fraction of patents filed.

Total patent application 31 (2004-2013) Granted: 2

SN	Title	Faculty	Application No.	Date of filing
1	A covalently crosslinked alginate-based wound dressing material. Jointly with Prof. Alok Ray and Sourabh Ghosh , Indian Pat. Appl. (2007),	Manjeet Jassal, Sourabh Ghosh,AK Ray		2007
2	An apparatus and a process for removal of arsenic	Bhuvanesh Gupta	210/DEL/2004	16-Feb-04
3	Gradient drawing process	B.L.Deopura	507/DEL/2004	18-Mar-04
4	Multifilament gradient heater	B.L.Deopura	509/DEL/2004	18-Mar-04
5	Antimicrobial grafted polypropylene suture.	Bhuvanesh Gupta	1049/DEL/2004	07-Jun-04
6	A Process for preparation of a composite polymer sheet and a sheet thereof	B.L.Deopura	1627/DEL/2004	27-Aug-04
7	A Process for inducting anti-microbial and anti-crease property in textile material and the material thus produced	Mangala Joshi	1679/DEL/2004	06-Sep-04
8	Supersorbent and a method of manufacture thereof	P. K. Banerjee	1867/DEL/2004	29-Sep-04
9	Process for and Insitu polymerization using melamine formaldehyde	A.K.Agrawal, Manjeet Jassal		19-Jan-06
10	Phase change material capsule and process for preparing the same.	A.K.Agrawal, Manjeet Jassal	162/DEL/2006	20-Jan-06
11	An Air Filtration Apparatus	Apurba Das	1630/DEL/2006	14-Jul-06
12	A method and apparatus for objective measurement of Fabric Appearance using digital image processing	B.K.Behera	2446/Del/2006	13-Nov-06
13	Anthropometric data and analysis of 509 men and 1000 women, 18-26 years, comprising 29 body measurements each (for men) and 35 body measurements each (for women)	Deepti Gupta	Copyright	22-May-07
14	Anthropometric data and analysis of 509 men and 1000 women, 18-26 years, comprising 29 body measurements each (for men) and 35 body measurements each (for women)	Deepti Gupta	Copyright	27-May-07
15	Mechanical processing of silk yarn	P. K. Banerjee	259/DEL/2008	30-Jan-08
16	Instrument to measure cut resistance of Fabrics	V.K.Kothari	276/Del/2008	30-Jan-08
17	Novel Phase Change Material Composition	A.K.Agrawal, Manjeet Jassal	1925/del/2009	16-Sep-09
18	A method of evaluation and grading of textile or fabric or garment appearance	R.S.Rengasamy	2304/del/2009	09-Nov-09
19	A method of evaluation and grading of textile or fabric or garment appearance	R.S.Rengasamy	2355/DEL/2009	16-Dec-09
20	Radiation process for the preparation of Silver Nanogel and Structures thereof	Bhuvanesh Gupta, T	83/DEL/2010	15-Jan-10

21	Eco friendly drug of cotton and other natural fibres	A.K.Agrawal,	Int. Ven.	22-Jul-10
22	Pale Yellow coloured nanosilver particles, a process for preparation and compositions thereof	Ashwini K. Agrawal, Manjeet Jassal	2628/Del/2010	02-Nov-10
23	Blue coloured silver nanoparticles, a process for preparation and compositions thereof	Ashwini K. Agrawal, Manjeet Jassal	2629/Del/2010	02-Nov-10
24	A System and method for obtaining Continuous pattern Blending in Textile Strands	S.M.Ishtiaque, TT	533/DEL/2011	28-Feb-11
25	Apparatus and methods for dyeing of fibers	Ashwini Agrawal,	767/Del/2011 (filed by Resil)	18-Mar-11
26	Apparatus and methods for dyeing of fibers	Ashwini Agrawal,	PCT/IB2011/001524 (filed by Resil)	30-Jun-11
27	A process for the preparation of scaffold of polycaprolactose by in-situ coagulation for tissue engineering (P)	Bhuvanesh Gupta,	1940/Del/2011	11-Jul-11
28	A fabric feel device for measuring quality parameters of a fabric	Apurba Das,	73/Del/2012	09-Jan-12
29	PVA supported resins for arsenic separation and product thereof (P)	Bhuvanesh Gupta,	837/DEL/2012	22-Mar-12
30	An apparatus and method for measuring wicking properties of a fabric material	Apurba Das,	1809/DEL/2013	19-Jun-13
31	Development of surfactant system for polymerization of fluoropolymers	Bhuvanesh Guipta,	3890/DEL/2012	
32	Interfacial polymerization process for preparation of phase change material capsule	A.K.Agrawal, Manjeet Jassal	128/DEL/2007	

4.5 Innovations of products, processes, designs, etc. in the department.

1	Pilling Tester based on Digital Image processing	Prof B K Behera
2	Drape Meter Based on Digital Image Processing	Dr B K Behera
3	A Process for the preparation of Polymeric Materials or Composites and(2) A Process for preparation of a composite polymer sheet and sheet thereof	Prof. B. L. Deopura.
4	An apparatus for measuring fabric hand value	Dr. Apurba Das
5	In-Plane wicking measurement system	Prof. Apurba Das

4.6 Availability and access to students' workshops, "tinkering laboratories" so that they may pursue their own ideas.

It is available at the institute level and our students actively participate in this laboratory.

4.7 No. of students/teams who have competed in national / international competitions, and outcome.

Year	International	National
2009	7	11
2010	2	9
2011	3	7
2012	3	8
2013	4	30

Awards won by the students in national / international competitions

Year	Student Name	Conference Name	National/International	Award Details
2010	Moumita Bera	National Convention of Textile Engineers	National	3rd Prize
2010	Ankita Srivastava	National Convention of Textile Engineers	National	2rd Prize
2012	Sarda Nara	BIND-12	National	3rd Prize
2012	Pratick Samanta	SPC, Pearl Academy,Delhi	National	2nd Prize
2013	Pratick Samanta	YRC, ICT Mumbai	National	1st Prize
2013	M. M. Sayeed	NIA, France	International	EDANA NIA student grant
2013	Mythili Tummmalapalli	Asian Polymer Association	National	1st Prize
2013	Mythili Tummmalapalli	YRS, IIT Delhi	National	3rd Prize
2013	Upashana Chatterjee	Polymer Processing Society	National	3rd Prize

5. R & D Environment

5.1 No. of post-doctoral scholars hired in the department/centre and their durations, from (i) abroad, (ii) on project, and (iii) others, and outcomes.

5 on projects.

5.2 No. of foreign students enrolled in (i) Masters, and (ii) PhD programmes.

	2009	2010	2011	2012	2013
M. Tech	2	1			1
Ph. D		2			

5.3 No. of Indian and foreign faculty/researchers who have spent a sabbatical in the department.

One

5.4 Sabbatical taken by faculty and where spent.

Prof. R. Alagirusamy: RWTH Aachen, Germany
Prof. Deepti Gupta, India
Prof. B. K. Behera, Shinshu University, Japan

5.5 Number of seminars (education and research separately) given by the faculty (i) in the department, (ii) in other departments, (iii) at other institutions.

Name of the faculty	In the department (Education + Research)	In other departments (Education + Research)	At other institution (Education + Research)
R. Chattopadhyay	5	3	2
Deepti Gupta	7	6	10 + 5
Manjeet Jassal	9	1	6
S. Mukhopadhyay		5	3
S. Ghosh	3	0	20
Abhijit Majumdar	4	1	4
Apurba Das	6		15+18
Rajiv Srivastava			1
R. S. Rengasamay	13		6
R. Alagirusamy	4		5+12
Dipayan Das	5	0	1
B. K. Behera	3	5	42
Bhanu Nandan			3
A K. Agrawal	3		5
B S. Butola	4		4

5.6 No. of faculty/researchers/scholars invited by the department for giving (i) seminars, (ii) spending at least a week in the department.

(i)

Sl. No.	**Faculty/ Scholar**	**Country**
1	Prof. Kurt. E. Geckeler	GIST, South Korea
2	Prof. Dominique Durand	CNRS University, France
3	Prof. Jelka Gersak	University of Maribor Slovenia
4	Prof. Tibor Cizaney	Budapest University, Hungary
5	Prof. Mario Lima	University of Minho, Portugal
6	Prof. J. Militky	Technical University of Liberec, Czech Liberec
7	Prof. Dana Cremenakoma	Technical University of Liberec, Czech Liberec
8	Prof. Raul Farngurio	University of Minho, Portugal
10	Prof. Ivan Martin	Univ Basel, Switzerland
11	Prof. David Kaplan	Tufts University, USA
12	Prof. Vivek Sharma	University of Chicago
13	Prof. Margaret Frey	Cornell University
14	Prof. Pascal Bruniaux	ENSAIT
15	Prof. Levent Onal	Turkey
16	Prof. Chris Sarr	UMIST
17	Prof. A. F. Seyam	NCSU
19	Prof. Rui Reis	University of Minho
20	Prof. Satish Kumar	Georgia Tech
21	Prof. Nandan Khokar	BiTeam, Sweden

(ii) Prof. B. Neckar, T. U. Liberec, Czech Republic
Prof. Jiri Militky
Prof. B. C. Goswami
Prof. Arun Pal Aneja, Du Pont

5.7 No. of faculty/researchers who visited the department on their initiative for giving (i) seminars, (ii) spending at least a week in the department.

Some of the visitors are:

Sl. No.	Faculty/ Scholar	Country
1	Prof. J. Militky	Technical University of Liberec, Czech Liberec
2	Prof. Vivek Sharma	University of Chicago
3	Prof. Margaret Frey	Cornell University
4	Prof. Pascal Bruniaux	ENSAIT
5	Prof. Levent Onal	Turkey
6	Prof. A. F. Seyam	NCSU
7	Prof. Subhash Anand	Bolton university
8	Prof. Rui Reis	University of Minho
9	Prof. Satish Kumar	Georgia Tech

5.8 Adequacy of research infrastructure.

Equipment wise, the department is well equipped.

The research infrastructure in the department though adequate needs continuous up gradation. Space is a big constraint along with skilled technical staff. Research scholars sitting area, a common room with basic facilities is badly needed. Space is required for inducting new faculty.

5.9 Adequacy of technical staff – existing numbers and competency areas; competency areas in which there is a shortage.
No. of technical staff: 13
Competency: Generally competent in the respective specialization, however, need continuous up-gradation and training as the sophistication of equipment and instruments is increasing.

5.10 Work space available for (a) Masters students, (b) Ph.D. students, (c) project staff, (d) post doctoral scholars.

	Masters	Ph.D	Project staff
Area (sq. ft)	10832	15000	5000

5.11 No. of national conference/workshops/seminars attended by PhD students (*total and per student for 5 years*).

Total 65 (conference). Per student approx. 2.0

5.12 No. of international overseas conference/workshops/seminars attended by PhD students (*total and per student for 5 years*).

Per student ~ 1.0

5.13 No. of students who have continued to Ph.D. (i) in same dept., (ii) other departments of IITD, (iii) in India, and (iv) abroad (separately for M.Tech. and B.Tech. students).

	Same department	Other department	In India	Abroad
M. Tech	17	2	6	14
B.Tech	1	-	1	6

5.14 No. of projects with co-guide from industry
Nil

5.15 No. of students who have spend time in industry as part of thesis/project work (give number and duration).
2 for 3 months approximately
4 for one month

5.16 Self assessment reports of the department/centers/schools if any.

The feedback from students and industry is discussed in several departmental committees from time to time , however, no formal report has been prepared. It may however be noted that self appraisal report of faculty and staff is generated every year.

5.17 Placement of M. Tech. and Ph. D graduates in technical careers

No such formal survey has been done, however, all the **Ph. D**. Students get employed in technical / teaching / research jobs,

M. Tech. students in technical jobs, some fetch teaching jobs as well

5.18 Inter-disciplinary work -: (i) joint thesis guidance by faculty across groups within a department, or across departments/centres, (ii) Proposals submitted and funded – PI-CoPI and their group/department affiliations.
More than 4 PhD thesis across departments
More than 6 project proposals

6. Outreach / External stakeholder engagement

6.1 Educational

(a) Workshops/Short term courses – topical research for disseminating research of IITD.

	Year	Title	Faculty involved	Remarks
1.	2008-09	Yarns For Knitting, Wearing And Management Aspects Of Textile Industry	Prof. R. Chattopadhyay	M/S Vardhman Textile Limited, Ludhiana
2.	2008-09	Quality upgradation for WSC Officers	Prof B K Behera	Office of the Development Commissioner for Handlooms, Ministry of Textiles, GOI
3.	2009-10	Quality upgradation for WSC Officers	Prof B K Behera	Devt Commissioner for Handlooms, Ministry of Textile
4.	2010-11	Process and Quality Control in Textile Industries	Dr Apurba Das	Participation fee based
5.	2011-12	Resins & Polymers Technology	Prof Mangala Joshi	Indian Paint & Coating Association, New Delhi
6.	2011-12	Needle - Punched Nonwovens Manufacturing , Characterization and Applications	Prof R S Rengasamy, Dr. Dipayan Das	Participation fee based
7.	2013-14	One day workshop on "Comfort in Protective Clothing"	Prof. Apurba Das, TT	DRDO & participation fees based
8.	2008	Medical Textile & Tissue Engineering (CEP Part)	Dr. Sourabh Ghosh	QIP-Cum-CEP
9.	2009	Emerging Trends in Fibers & Textile (CEP part)	Dr. A. Majumdar Dr. S. Mukhopadhayay	QIP-cum-CEP
10.	2009	Engineering of function of Clothing (CEP part)	Dr. Deepti Gupta	QIP-cum-CEP
11.	2011	Workshop on 3 D cell Culture System & Tissue Engineering	Dr. Sourabh Ghosh	CEP
12.	2013	Executive certificate Program in Apparel And Textile Management	Dr. A Majumdar Dr. Mahim Sagar (DMS)	CEP

(b) Workshops/Short term courses – educational methods (teaching, learning resources, pedagogy).

NPTEL workshop / meeting in the department.

(c) Learning, research material on the website.

PPT slides are provided to the students through internal web. All students have access to internet in the hostel and institute. NPTEL courses.

(d) Science & technology for public information – on website.

Some papers published are put up on department and individual faculty web pages. .

(e) Courses taught to students of other IITs/NITs/Other institutions.

Ph.D students of Gautam Buddh Technical University have attended pre Ph.D courses under the mentorship of faculty members.

(f) Courses taught via NKN.
NIL

(g) Courses developed for NPTEL.

S.No.	Faculty	Course Title	Type
1	P K Banerjee	Knitting Technology	Web
2	Dipayan Das	Nonwoven Technology	Web
3	Apurba Das	Textile testing	Web
4	Ashwini K. Agrawal	Manufactured Fibre Technology	Web
5	Prof. R. Alagirusamy	Yarn Manufacture-II	Web
6	Prof. Bohuslav Neckár	Theory of Yarn Structures	Video
7	Manjeet Jassal	High Performance And Speciality Fibers	Web
8	Dipayan Das	Statistical Quality Control in Textiles	Web
9	P K Banerjee	Shuttleless Weaving	Web
10	R.S. Rengasamy	Mechanics of Textile Machinery	Web
11	Abhijit Majumdar	Fabric manufacture I	Web
12	B S Butola	Textile Chemical Processing Theory and Practice of Preparatory Processes	Web
13	Samrat Mukhopadhayay	Textile Fibers	Web
14	M. L. Gulrajani	Theory and Practice of Dyeing	Video

(h) Books, monographs, study material made available outside IITD.

Sl. No.	Title of the book	Author/ Editor
1	Woven textile structures	B. K. Behera & P. K. hari
2	"Science in clothing comfort" -Authors: Dr. Apurba Das and Prof. R. Alagirusamy, Woodhead Publishing India, Published in February 2010.	Apurba Das & R Alagirusamy

3	Process control in textile manufacturing, Woodhead Publishers, U.K.	Abhijit Majumdar, Apurba Das, R. Alagirusamy & V. K. Kothari
4	Soft computing in textile engineering, Woodhead Publishers, U. K.	Abhijit Majumdar
5	Advances in Polyester and Polyamide Fibres' Woodhead Publications, 2008	B. L. Deopura, R. Alagirusamy, M. Joshi & B. Gupta
6	Theory of structure and mechanics of fibrous assemblies, Woodhead Publishing India Pvt. Ltd., New Delhi, 2012.	Neckář, B. and Das, D.
7	Anthropometry,apparel sizing and design, Published by Woodhead publishers (Elsevier) 2014.	D Gupta and N Zacharia,
7	Advances and dyeing and finishing of technical textiles	M. L. Gulrajani
8	Technical textile yarns	Alagirusamy & A. Das
9	Colour Measurement: principles, advancement and industrial applications	M. L. Gulrajani
10	Testing and quality control, IAFL Publishers	V. K. Kothari
11	Technical textiles: Technology, developments and applications	V. K. Kothari
12	Textile fibres: developments and innovations	V. K. Kothari

(i) Experiments developed and made available to other institutions.

(j) Seminars live/via NKN, web to other institutions in India/abroad

Lecture delivered via video conferencing to Ichhalkaranji College of Textiles

(k) Reach out to schools, NCERT, KVs, etc. (e.g. K-12 programmes).
Department participates in IIT Open House which attracts school children.

(l) Mentoring of other institutions, e.g. new IITs, NITs, universities, etc. including faculty mentoring, curriculum development, laboratory development, etc.

Many faculty members are member board of studies in different universities and actively participate in framing curriculum, laboratory infrastructure and recruitment of faculty. The universities which have received our co-opeartions are: NIT Jalandhar, , Institute of Carpet & Textile Technology, Bhadoi, MLV college of Engineering, Bhilwara, TIT & S Bhiwani, Uttar Pradesh Textile Technology Institute, IGNOU, Kumaraguru college of Technology, PSG college of technology, Miranda House, DU.

6.2 Industry collaboration

(a) No. of students (Ph.D./Masters) directly linked to industry funded projects.
More than 11

(b) No. of industry staff/engineers who have taken a regular course(s) for entire semester.
NIL

(c) Technology transfer to companies, entrepreneurs, local and other governments/government agencies, NGOs (separately).

Sl. No.	Technology transferred	Faculty involved
1	Pilling Tester based on Digital Image processing	Prof B K Behera
2	Drape Meter Based on Digital Image Processing	Dr B K Behera
3	A Process for the preparation of Polymeric Materials or Composites and(2) A Process for preparation of a composite polymer sheet and sheet thereof	Prof. B. L. Deopura.
4	An apparatus for measuring fabric hand value	Dr. Apurba Das
5	In-Plane wicking measurement system	Prof. Apurba Das
6	Warp sizing materials for nylon filament beam	
7	Dyeing retardant	A K Agrawal
8	Softener auxillary	A K Agrawal
9	Antimicrobial nanofinish	A K Agrawal Manjeet Jassal
10	Self-cleaning nanofinish	A K Agrawal Manjeet Jassal
11	Low GSM coated textile for cooler interiors	A K Agrawal Manjeet Jassal
12	Low GSM coated textile for FR application	A K Agrawal Manjeet Jassal
13	Low GSM coated textile for easy cleaning	A K Agrawal Manjeet Jassal
14	Acid dyeable acrylic fibres	A K Agrawal Manjeet Jassal
15	Transparent scaffolds for ocular implants	A K Agrawal Manjeet Jassal

(d) Continuing education/courses for industry.

Refer to 6.1 (a)

(e) Faculty secondment to industry.

One

(f) Research projects undertaken with industry as partner.

SMITA research project,
Natural Dye extraction
Plasma machine development.
Drawframe for multi colour roving
Image processing based equipment

(g) Laboratories, equipment, etc. provided by industry for use in UG / PG teaching laboratories and student projects.

S. No.	Machine	Industry
1	Carding	Vardhman Group
2	Autoconer Winding machine	Vardhman Group
3	Blending draw frame	Alps Industries

(h) Seminars/workshops held with industry by the department.

Five

6.3 Professional

(a) Service as Board, Senate, selection committee member at other IITs, NITs, and Universities.

Faculty members have served in boards and selection committees of various universities including:

1. NIT Jalandhar
2. GNDU university
3. Mahila vishwavidyalaya, Panipat
4. DRDO
5. MS University, Vadodara
6. UPTTI Kanpur
7. IICT Bhadoi
8. NITRA Ghaziabad
9. MLV Textile Institute
10. ICT Mumbai
11. MD University
12. PSG College of Technology
13. Kuruchetra University
14. SGGS University, Nanded
15. UPSC
16. ICAR

(b) Service as Ph.D. thesis examiner at other institutions.

The faculty members of the department have acted as Ph.D thesis examiners of various universities including

1. GNDU
2. Jamia
3. MS UNIVERSITY
4. Jadavpore University, Kolkata
5. IIT Mumbai
6. IISc
7. NM University, Jalgaon
8. University of Pune
9. UPTU, Lucknow
10. Jamia Millia Islamia
11. HP University, Shimla

12. TIT Bhiwani
13. Vishveswaraya Technological University
14. Anna University
15. Karnataka University
16. Bharathiar University
17. University of Mara, Malaysia

(c) Service as technical expert on committees – MHRD, DST, DSIR, DRDO, Pan-IIT initiatives, other ministries, state and local governments.

Faculty members have served as technical experts on various committees of MHRD, DST, DSIR, DRDO, Pan-IIT initiatives, other ministries, state and local governments including

1. DST
2. DRDO
3. AICTE
4. DSIR
5. CSIR
6. India-Sweden collaboration project for DBT
7. DBT
8. NPL
9. Jute Board

(d) Technical expert on policy, regulatory, laws, standards committees.

- Technical Textiles committee of Ministry of Textiles
- Bureau of Indian Standards

(e) Member of Board/Advisory Board of public and private sector corporations.

- Central Silk Board
- NIT Rourkela
- PGI Chandigarh
- Addi Industries Ltd
- Seasons Textiles Ltd
- Alps Industries
- NITRA

(f) Positions (e.g. Director, Vice Chancellor, etc.) held by faculty on lien.

Director IJIRA
Director NITRA

6.4 Contribution to national development goals

(a) Projects undertaken and their outcome.

- NPTEL and EKLAVYA are the nationally relevant project which faculty member of the department is coordinating as IIT D coordinator. This is the single most intervention in the area of technical education in the country where IITs and IISc are participating.
- Faculty members are engaged with KVIC and State Khadi Boards for development of appropriate technology for Khadi sector
- Faculty has actively participated in national bamboo mission project

(b) Policy inputs – implications, visible impact on society.

Technical Textile Policy of MoT, Govt of India

(c) Entrepreneurship development.

One company was incubated at IIT Delhi where faculty members were involved.

6.5 Alumni engagement

(a) Regular interactions / engagement with alumni and outcomes.
The department organises an Alumni meet each year known as Antarang.

(b) Contributions from alumni.

They actively participate in workshops for curriculum development.
Alumni interact formally in class and also informally through Textile Engineering Society. They support the student activities by in cash and kind.

6.6 Recognitions and Awards

(a) Awards to faculty.
Mahe Award, Nina Saxena excellence in technology award ,etc.

(b) Fellows of academies, INAE, etc.

Fellow of Textile Association 2012
Fellow of Textile Institute

7. Governance

7.1 Governance

(a) Organization structure – their autonomy/ terms of reference

	Sl. No.	Committees	Autonomy/ terms of reference
Head	1	Programme coordinators B. tech, M. Tech and Ph. D	To monitor the progress of students, and advice them in course registration, organizing seminar by students, project viva- voce examination (B. tech & M. Tech students) , written and oral comprehensive examination of Ph. D students,
	2	Departmental research committee	Selection of Ph. D students, allotment of Ph. D students to faculty members, approval of funded projects, allotment of supervisor of M. Tech students,
	3	Lab in charges	Administration of technical staff, purchase of laboratory ,material and equipment as approved by faculty board.
	4	Departmental space committee	Sorting out and space related issues in the department.
	5	Industry institute Interaction Committee	Organizing meet with industry personnel
	6	Departmental Monitoring Committee for students	Monitoring of weak students and advising them in course selection or any other personal matter.
	7	Others: Library & Resource Centre, Time Table, Website, Annual Report, Publications, store, TES, Safety	General upkeep of resource centre, making time table for the department, Liasoning with central library, purchase of books

(b) Planning documents developed by the department – space, faculty, staff related.

Documents related to departmental thrust and research areas have been developed through workshops for implementation.

(c) Records of discussions within the department – internal documents (meeting minutes, position papers, discussion papers, concept papers, etc.)

All minutes related to Faculty Board meetings, Departmental research committee meetings , Professorial committee meetings are kept in files and a soft copy is sent to all faculty members.

DFB meeting details

Year 2009		Year 2010	
Date	Attendance	Date	Attendance
5.2.2009	20	28.1.10	17
2 & 6.4.2009	19	15.3.10	17
4.5.2009	14	29.3.10	13
13.7.2009	18	13.7.10	20
14.9.2009	17	9.11.10	20
4.11.2009	18	29.11.10	23

Year 2011		Year 2012	
Date	Attendance	Date	Attendance
25.1.11	16	10.1.12	19
24.2.11	17	30.1.12	19
26.5.11	18	14.5.12	20
19.7.11	16	17.5.12	17
18.8.11	19	22.8.12	19
1.12.11	20	25.9.12	18
2.12.11	19		

Year 2013	
Date	Attendance
10.1.13	18
14.2.13	13
12.3.13	14
14.3.13	17
26.3.13	10
19.7.13	14
13.8.13	17
29.8.13	18

DRC meeting details

Year	Date	Attendance	Year	Date	Attendance
2011	5.1.2011	7	2012	20.1.2012	5
	24.1.2011	6		23.1.2012	6
	21.2.2011	6		2.2.2012	5
	3.3.2011	6		14.3.2012	6
	22.3.2011	6		19.4.2012	6
	20.4.2011	6		8.5.2012	5
	18.5.2011	6		31.5.2012	7
	20.5.2011	7		21.6.2012	6
	1.6.2011	5		26.7.2012	5
	19.7.2011	6		16.8.2012	5
	28.7.2011	7		25.9.2012	6
	18.8.2011	7		4.10.2012	7
	15.9.2011	7		22.11.2012	8
	22.9.2011	6		17.12.2012	7
	20.10.2011	6			
	17.11.2011	7			
	21.11.2011	6			
	3.12.2011	7			
	15.12.2011	6			
2013	2.1.2013	6			
	17.1.2013	7			
	21.2.2013	6			
	14.3.2013	8			
	22.3.2013	7			
	22.4.2013	6			
	15.5.2013	7			
	29.5.2013	7			
	5.6.2013	7			
	10.7.2013	6			
	30.7.2013	7			
	30.8.2013	7			
	20.9.2013	7			

(d) Physical resources – percentage utilization for UG PG core and electives teaching separately, UG and PG student projects, Ph.D. student research. Projections for future.

We do not have separate UG & PG labs. Labs are used both for UG PG teaching and research

UG/ PG/ Ph.D	Utilization
UG teaching	70%
PG teaching	70%
UG projects	100%
PG projects	100%
Ph. D research	100%

(e) Financial resources – (i) funds provided to the department, (ii) processes of distribution, (iii) funding for focus areas, (iv) funding for UG and PG core teaching laboratories. Outcomes of funds utilization. Changes in funding pattern and funds utilization, and effects on departmental strategy.

Fig in lacs

Period	NPN05 (Recurring)	PLN03 (Non-recurring)	PLN3C (Upgradation)	PLN03F (Faculty computers)	PLN05 (Furniture)
2009-10	23.32	110.00	191.00	--	0.50
2010-11	32.86	79.91	--	3.00	3.50
2011-12	35.00	90.00	--	3.00	2.00
2012-13	40.00	110.00	--	3.60	9.90
2013-14	40.00	70.00	--	3.75	18.86
	171.18	459.91	191.00	13.35	34.76
Total	**171.18**	**699.02**			

The department receives fund from the institute under mainly two heads Plan and non plan.

Fund utilization

Sl. No.	**2009-2010**	**Sl. No.**	**2010-2011**
1.	Software Geodict 2009.4 CPU Version	1.	Emersion 2x 40 KVA UPS
2.	Thermal Analyser system	2.	Mathis 2-Roll laboratory Padder horizontal/vertical
3.	Thermogravimetric analyser with high resolution	3.	Laboratory drying condensation and fixation apparatus
4.	Syris Laboratory Modular Reactor Model ATLAS	4.	Mathis Laboratory dryer with coating device
5.	Micro Tensile Tester	5.	Oxford EDS system
6.	Automatic Capillary flow Porometer with E-extended accuracy	6.	Freeze dryer systems
7.	Vedio Extensometry High Resoulution Vedio extensiometer	7.	Table mounted material testing system
8.	Water Vapour Transmission Tester	8.	Dispensing system
9.	Zetasizer Nano	9.	Rapid Prototype direct working machine with software
10.	Oxygen Permeability Tester	10.	Multiview 2000(NSOM/SPM/TI and sample scan head assembly
11.	UV Visible Spectrometer	11.	Leica Polarising optical microscope
12.	Drop shape analyser system using optical radiation	12.	Nikon Trinocolour Polarizing Microscope
13.	Porometer Macro through Porosize	13.	Solver pro contact

	analyser		AFM/LFM/Resonant (SEM Icontact-Non contact AFM)
14.	Filter Media handling system	14.	Lab Scale Electrospinning Unit
15.	Triple Detector Array System with RI Viscometer	15.	Conformat 2 Pressure measuring system
16.	Micro Raman Spectroscopy System		
17.	Mass Spectrometer		
18.	Cryo-SEM Workstation (Rotary pumped)		

Sl. No.	**2011-2012**	
1.	High Voltage Plasma treater Generator	13. High speed circular Rib knitting machine
2.	Rheometer	14. Fast knit weft circular knitting machine
3.	Density Gradient columns	15. Automatic tensile and shear tester (KATO)
4.	FT NMR systems	16. Fabrication of instrument for measurement of electrical conductivity of textile fabrics
5.	Environmental Scanning Electron Microscope	17. Fabrication of instrument for testing compression shear and bending properties of carpets.
6.	EVO 18 Scanning Electron Microscope	**2012-13**
7.	Small Angle X-ray Scattering system	1. Plasma treated Generator
8.	Mathis Beaker dyeing apparatus	2. Daelim Starlet Lab IR Dyeing machine
9.	Clean Air Balancing Unit	3. Motic Trinocular Research Polarizing Microscope
10.	Magnetic Levitated Vortex dyeing machine	4. Fabric UV Transmittance Analyser
11.	MMT Moisture Management Tester	5. Tensiometer
12,	Laboratory Nonwoven line (DILO Germany)	6. Spencers Rotary Microtome
		7. Laboratory Scale Melt Spinning machine

(f) Delegation of decision making within department/centre. List the processes and structures for financial and academic management, and the methodology for their review.

All the decisions related to academic administration and space utilization are taken by Departmental Research committee, Professorial committee and space committee. The decisions taken are ratified in the Faculty board.

The available financial budget related to purchase of books and equipments is discussed in faculty board. Priority list is prepared for laboratory equipments. The lab in- charges in turn procure the equipments. The books recommended by faculty are approved in faculty board meetings and sent to main library for procurement.

7.2 Department management and operations

(a) Organization structure - mandates, flexibility, etc.

	SN	Body/Faculty	Responsibility
Head	1	Programme co-ordinators B. tech, M. Tech and Ph. D	To monitor the progress of students, and advice them in course registraion, organizing seminar by students, organizing project viva- voce examination (B. tech & M. Tech students) , written and oral comprehensive examination of Ph. D students,
	2	Departmental Research committee	Selection of Ph. D students, allotment of Ph. D students to faculty members, approval of funded projects, allotment of supervisor of M. Tech students,
	3	Lab incharges	purchasing of materials for conduction of practical, new lab equipments, administration of technical staff.
	4	Departmental space committee	sorting out and space related issues in the department.
	5	Industry institute Interaction Committee	Organizing meet with industry personnel
	6	Departmental Monitoring Committee for students	Monitoring of weak students and advising them in course selection or any other personal matter.
	7	Others : Library & Resource Centre, Time Table, Website, Annual Report, Publications, store, TES, Safety	General upkeep of resource centre, making time table for the department, Liasoning with central library, purchase of books

(b) Processes for curriculum planning.

Institute wise curriculum planning is carried out every 10 years. A committee known as Undergraduate Curriculum Review Committee (UCRC) is formed consisting of members from each undergraduate degree offering department. Similarly another review committee for PG curriculum is also under taken. The committees deliberate over various aspects of curriculum that includes discussion with all stake holders viz. recruiters, students , alumni and faculty. A draft proposal of the structure of the curriculum is made after lot of brain storming sessions and sent to all stake holders for their feedback. Based on the feedback a final proposal is made for ratification in senate. Departments are requested to make templates of the various courses to be offered by the department. Keeping in mind the advancements made in different fields and emergence of new areas new courses are designed and templates made. The templates of all the courses are sent to Dean Academic. The templates are sent to all departments for comments and subsequently to senate for approval.

(c) Processes and methods for teaching resources management.

The labs are managed by respective lab in charges. The requisition of chemicals, fibres, fabrics and other items are monitored by respective lab in charges.

The audiovisual units are maintained by computer lab technician.\ under the guidance of lab in charge.
The purchase of non plan items are initiated by students. The requisition is raised by them which is endorsed by supervisor and lab in charges. It is brought to HOD by the store keeper for placement of order to the vendor. The store keeps a track of the expenditure being incurred under various head and inform HOD.

(d) Guest faculty, affiliation for teaching core, elective UG & PG courses.

1.Dr. S. K. Chaudhury	(Wool Mark Company)
2. Mr. S. K. Bhatia	(Indo Rama Synthetics Ltd.)
3.Prof. Bohuslav Neckar	(Technical University of Liberec, Czech Republic)
4. Dr. Arun Pal Aneja	(Reliance)
5. Prof. Subhsh Anand	(Bolton University, UK)

(e) Faculty short-listing criteria.

MINIMUM SHORT-LISTING CRITERIA FOR AN **ASSISTANT PROFESSOR**

- PhD. With 3 years experience (excluding the experience gained while pursuing Ph.D)
- First class or equivalent grade in preceding degrees in respective discipline, with a consistently good academic record,
- Potential for very good teaching,
- Maximum age is 35 years for male (to be relaxed by 3 years for female candidates and 5 years in case of persons with physical disability, SC and ST) and
- *At least 4 refereed journal papers.*
- *Those who were short listed against the last advertisement but were not selected, can be shortlisted again provided they show substantial improvement in academic / research in last one year . They should have published at least one research paper in referred journal outside of their Ph. D work.*
- *To decide the suitability of a person for an area , candidate's M. Tech project work or Ph. D thesis should be in the relevant area.*

MINIMUM SHORT-LISTING CRITERIA FOR AN **ASSOCIATE PROFESSOR:**

- PhD. With 6 years experience (excluding the experience gained while pursuing Ph.D) of which at least 3 years should be as Assistant Professor or equivalent,
- First class or equivalent grade in preceding degree in respective discipline, with a consistently good academic record,
- Should have demonstrated capability for good teaching,
- At least 10 refereed journal papers (of which at least 2 in last 3 years), and
- Completed at least one sponsored R&D or consulting project as a PI or completed two sponsored R&D or consulting projects as a Co-PI.
- *The IRD / Planning section funded projects given to new faculty will not be considered. However, High impact project funded by IIT will be considered.*
- *For consultancy non testing type work will only be considered .*

MINIMUM SHORT-LISTING CRITERIA FOR A **PROFESSOR:**

- Ph.D with 10 years experience (excluding the experience gained while pursuing Ph.D.) of which either:
  a. At least 4 years should be as Associate Professor or equivalent , or
  b. At least 8 years should be as Assistant Professor or equivalent (in case of institutions where the post of Associate Professor or equivalent does not exist),
- First class or equivalent grade in preceding degree in respective discipline, with a consistently good academic record.
- Should have demonstrated excellence in teaching.
- At least 20 referred journal papers (out of which at least 3 in last 4 years).
- Should have guided independently at least one Ph.D. student, or have guided at least two Ph.D. students jointly with other faculty/ researchers, and
- Completed:
  a. One sponsored R&D or consulting projects as a PI, and
  b. One more sponsored R&D or consulting project as a PI, or two sponsored R&D or consulting projects as a Co-PI.

- *The IRD / Planning section funded projects given to new faculty will not be considered. However, High impact project funded by IIT will be considered.*
- *For consultancy, non testing type work will be considered only.*

(f) How collectiveness of the faculty has enhanced academic output and enhanced quality, etc.

New courses have been developed such as

TTL746: Medical Textiles 3-0-0 3
TTL740: Science and Applications of Nanotechnology in Textiles 3-0-0
TTL750; Science of Clothing Comfort 3-0-0 3
TTL782: Nonwoven Science and Engineering 3-0-0 3
TTL765: Product Development 2-1-0 3
TTL830: Modeling and Simulation in Fibrous Assemblies 2-0-2 3
TTL710: High Performance and Specialty Fibres
TTL719: Functional and Smart Textiles
TTL752: Design of Functional Clothing
TTL763: Technical Textiles
TTL766: Design & Manu. of Text. Structural Composites

(g) Nature, quantum and quality of support from of secretarial staff, stores and inventory management, purchases, ambience, etc.

The Department has staff for office management, stores etc., who are reasonably equipped and qualified for the jobs assigned.

7.3 Faculty

(a) Faculty profile, and a critique of the same.

All faculty members are well qualified with Ph. D. degree in relevant areas and have studied and worked in reputed institutes in the country or abroad. The details are given in following section.

(b) Diversity in faculty profile by: (i) gender, (ii)category, (iii) region, (iv) Ph.D. institution, (v) post-doctoral institutions worked in, (v) organizations/industry worked in, (vi) employment prior to joining the department.

(i) Gender

	Male	Female	Total
Faculty	19	3	22

(ii)Category

	Gen	OBC	SC/ ST
Faculty	22		-

(iii)Region

	East	West	North	South
Faculty	8	1	11	2

(iv) Ph. D Institution

	Within India		Outside India	
	IIT Delhi	Other	USA	EUROPE
Faculty	10	4	2	6

(v) Post doctoral institution work

S. No.	Faculty	Name of the institution
1	R. Chattopadhyay	Kyoto University Japan
2	Bhanu Nandan	NTHU Taiwan, Leibniz Institute of polymer research, Germany
3	R. Rengasamy	Kyoto University, Japan
4	A.K.Agrawal	Wright Paterson Air Force Base, Dayton, Ohio, USA
5	Sourabh Ghosh	Tuft University

(vi) Organisation/ industry worked

S. No	Faculty Name	Employment prior to joining IIT
1	Rajiv Srivastava	Procter & Gamble, GE (India)
2	AbhijitMajumdar	GC E &TT, Berhampore, West Bengal; Vardhman Group; Voltas Ltd.
3	Apurba Das	NITRA, Ghaziabad; Alps Industries; Jayashree Textile; DIGJAM
4	AshiwiniAgarwal	Trinity Projects International Inc. ,Dayton,OH; Wright Patterson Air Force Base, Dayton, OH.
5	Dipayan Das	NCSU; Voltas Ltd; Arvind Mills
6	SamratMukhopadhyay	Fibrous Materials Research Group, Portugal; Arvind Mills; Kumaraguru College; Anuradha Engineering College
7	R. Alagirusamy	PSG College of Technology; Voltas Ltd.; Customs Composite Material Ltd.; Atlanta,USA
8	R. Rengasamy	Anna University, Chennai
9	Mangla Joshi	NITRA, Ghaziabad
10	ManjeetJassal	R & D, IPCL, Baroda

11	B.K. Behara	NITRA, Ghaziabad; IDBI
12	Bhuvanesh Gupta	PSI, Switzerland; CNRS,France
13	AmitRawal	University of Bolton; CSIR, South Africa; K.U. Lewen(Belgium)
14	S.M. Ishtiaque	HDPE Textile Mills, Indore; Mahavir Spinning Mill; Jaipur Spinning & Weaving Mill; ATIRA, Ahmedabad
15	R. Chattopadhyay	Svadeshi Mills, Bombay
16	B. S. Butola	Guru Nanak Dev University, Amritsar; Paharpur Plastics &KanoriaPetroproducts, Ghaziabad
17	Sourabh Ghosh	Tissue Engineering Research Centre, Bolton, USA
18	Kushal Sen	Modi Spinning & Weaving Mills Ltd.
19	Deepti Gupta	TITS, Bhiwani; Alps Industries Ltd., Ghaziabad
20	V.K. Kothari	Gwalior Rayon
21	B.L. Deopura	Shriram Institute of Industrial research , Delhi
22	Bhanu Nandan	IMCTC, Dresden University of Technology, Germany

(vii) Employment prior to joining IIT

S. No	Faculty Name	Employment prior to joining IIT
1	Rajiv Srivastava	Procter & Gamble, GE (India)
2	Abhijit Majumdar	GC E &TT, Berhampore, West Bengal
3	Apurba Das	NITRA, Ghaziabad
4	Ashiwini K. Agrawal	Trinity Projects International Inc. ,Dayton, OHIO
5	Dipayan Das	NCSU, USA
6	Samrat Mukhopadhyay	Fibrous Materials Research Group, Portugal
7	R. Alagirusamy	PSG College of Technology, CCMI, Atlanta, USA.
8	R. Rengasamy	Anna University, Chennai
9	Mangla Joshi	NITRA, Ghaziabad
10	Manjeet Jassal	R & D, IPCL, Baroda
11	B.K. Behara	NITRA, Ghaziabad; IFCI
12	Bhuvanesh Gupta	PSI, Switzerland
13	Amit Rawal	University of Bolton
14	S.M. Ishtiaque	HDPE Textile Mills, Indore
15	R. Chattopadhyay	Svadeshi Mills, Bombay
16	B. S. Butola	Guru Nanak Dev University, Amritsar
17	Sourabh Ghosh	Tissue Engineering Research Centre, Boston, USA
18	Kushal Sen	Modi Spinning & Weaving Mills Ltd.
19	Deepti Gupta	TITS, Bhiwani
20	V.K. Kothari	Gwalior Rayon
21	B.L. Deopura	Sri Ram Institute of Industrial research, Delhi
22	Bhanu Nandan	IMCTC, Dresden University of Technology, Germany

(c) Procedure for faculty searches.

Advertisement in leading news papers, rolling advertisement in IIT Delhi web sites, Direct contact.

Areas to be advertised and the levels are decided in Professorial committee meeting and the institute is informed accordingly. The post are advertised by the institute. Once the last date is reached the application are received by the department. Short

listing criterion is decided by the professorial committee which can not go below the institute level criterion set. The applicants are short listed and called for personal interaction with faculty. The external candidates and internal candidates if any are asked to make a presentation of their research work. The recommendation of the professorial committee is sent to the selection committee.
(Faculty Information Brochure has been prepared))

(d) Result of faculty searches – area-wise , number of applicants, short-listed and offered a position, their educational qualifications & experience.

Year	**Area**		**No. of applicants**	**Short listed**	**Positioned offered**	**Qualification**	**Experience**
2012	Mechanical processing	Professor	3	1	1	Ph. D	
		Associate professor	5	3	2	Ph. D	
		Assistant professor		3			
	Chemical processing	Professor	2	1	1	Ph. D	
		Associate professor	3	1	1	Ph. D	
		Assistant Professor	21	5	0		
2013		Assistant professor	7	1	0		

(e) Success in recruitment (data for last 5 years), and offers that the persons had from other IITs/IISc/TIFR.

No other IITs or IISc or TIFR is having Textile Technology Department.
However, faculty from other colleges have been apponited.

(f) Faculty lost to other institutions post selection.
NIL

(g) Faculty time utilization – in class, in meetings, Project management , Ph.D. guidance, Masters project guidance, UG project guidance.

	Faculty time utilization (%)					
Activity	Class	Meetings	Project management	Ph.D guidance	Masters project guidance	UG project guidance
	20	10	30	25	15	10

(h) Level of harmony amongst department faculty.

There is outstanding working harmony amongst faculty members within the department.

7.4 Students

(a) Criteria for short-listing and selecting students for admission to Master's and Ph.D. programmes of past 5 years

Short listing criteria for M.Tech.

Degree	Marks (equivalent CGPA on scale of 10)	GATE Score
BE /B. Tech (Textile)		
GE	65% (7.125)	≥ 400
OBC (NCL)	65% (7.125)	≥ 360
SC/ST/PH	60% (6.75)	≥ 266
B.E./B. Tech. (non textile)/ M.Sc.		
GE	65% (7.125)	≥550
OBC(NCL)	65% (7.125)	≥495
SC/ST/PH	60% (6.75)	≥366

Short listing criteria for Ph. D.

Degree	Marks (equivalent CGPA on the scale of 10)	GATE Score
BE /B. Tech. (Textile)		
GE	70% (7.5)	≥ 400
OBC (NCL)	70% (7.5)	≥ 360
SC/ST/PH	65% (7.125)	≥ 266
B.E./B. Tech. (non textile) / M.Sc.		
GE	70% (7.5)	≥550
OBC(NCL)	70% (7.5)	≥495
SC/ST/PH	65% (7.125)	≥366
M.Tech.		
GE	65% (7.125)	NA
OBC(NCL)	65% (7.125)	NA
SC/ST/PH	60% (6.75)	NA

Additionally the candidate should have taken Physics, Chemistry, and Mathematics in 12th standard
and should have obtained First class in all the previous degrees and certificates (including class 12)

(b) Facilities provided to students and their maintenance/management system.

(i) All Ph. D students receive assistantship form the institute.
(ii) Some students are given assistantship from projects also.
(iii) The department reimburses contingency expenses
(iv) Grants are given to attend international (one) & national conferences

(v) Ph. D students working in projects are provided hostel accommodation
(vi) Married students are provided married accommodation if available.

(c) Mentoring seminars/sessions held for Ph.D. students for prospective faculty careers.

Students are encouraged to make their career in teaching.

8. Benchmarking

8.1 Identify departments/centres within IITD as peers.

Being an unique department in IIT system we cannot really bench mark our self with any other department in IIT. However we do interact with many departments/ centers and do joint research projects.

8.2 Identify departments/centres/schools/divisions from other IITs, IISc, NITs, private universities as peers, and reasons/criteria there for.

The Department of Textile Technology is the only one in the family of IITs and truly speaking there is no IIT or other institute of similar stature in country. We normally benchmark ourselves in the area of conventional textiles. However, in the areas of polymer materials and composites, such departments from other IITs are our peers because some of their activities overlap with us.

Some institutes which work in areas of interest are:

S. No.	Institute / College
1.	IIT Kharagpur
2.	IIT Bombay
3.	NIT Jalandhar
4.	ICT Mumbai
5.	Government College of Engineering & Textile Technology, Serampore
6.	The Technological Institute of Textile & Sciences (Bhiwani)
7.	Government College of Engineering & Textile Technology Behrampore
8.	Uttar Pradesh Textile Technology Institute (Kanpur)
9.	Maharaja Sayajirao University Of Baroda
10.	SSM College Of engineering
11.	MLVTI college of engineering Bhilwara
12.	PSG college of Technology
13.	AC College of Technology, Chennai

8.3 Identify departments/centres from institutions in other countries as peers.

1. The Technical University of Liberec, Czech Republic
2. Department of Material Science and Engineering- Clemson University- USA
3. School of Textiles- North Carolina State University- Raleigh- USA
4. School of Design, University of Leeds, U.K
5. Institute of Textile Technology- Aachen University- Germany
6. Institute for Macromolecular Chemistry and Textile Chemistry-Dresden University of Technology- Germany
7. Textile Science & Technology- The University of Manchester

8. Department of Textile Science and Technology- Shinshu University- Japan
9. Department of Textile Science- Kyoto Institute of Technology- Japan
10. Donghua University, China
11. Department of Human Ecology, Cornel University
12. Georgia Institute of Technology
13. University of Minho
14. ENSAIT, France
15. Deakin University, Australia
16. Bolton University, U. K.

8.4 Define parameters for benchmarking (i) research, (ii) curriculum - separately for UG, Masters, and Ph.D. programmes, (iii) teaching-learning processes.

I. Research:

- Quality of student input
- Number of registered students
- Number and quality of publications in journals and conferences
- Number of Patents
- State-of-the-art research facilities
- Funded research projects
- Research collaborations
- Cutting edge research
- National importance and social relevance

II. Curriculum:
Data included in section 1.3 (j)

III. Teaching learning process:

- Defining specific objective
- Evaluation as per defined objectives
- Use of ICT in teaching -learning process
- Student Feedback on teaching learning process
- Experiments in pedagogy
- Tutorials and hands-on experience

8.5 Perform benchmarking and report the analysis/findings for the last 5 (or 10) years.

Refer to section 2.12. The performance of the department is very good and above.

9. Feedback systems and results

9.1 System for feedback from UG students and its results.

All UG students give their feed back in regard to the courses taught This course feed backs are accessible to the respective teachers , HOD and Dean (Academic). The course feedback helps the teachers in finding out shortcomings if any, in the teaching - learning process.

For results, refer to section 2.12.

System for feedback from PG, Master's and Ph.D., students, and their outcome.

Meetings are organised with PG and Ph. D students separately. These meetings are attended by respective programme co-ordinators and HOD. The issues related to academics, laboratory management, sitting spaces and jobs are discussed . Short and long term measures are taken to resolve.

9.2 System for feedback from recruiters (i) on-campus, and (b) off-campus - separately for UG and PG graduates; and the results.

Each year the recruiters are required to give feed back in writing centrally to Training & placement unit which is shared with concerned department. After internship also the performance of students from industry is received in writing through a confidential certificate.

Whenever a faculty visits any industry consulting job or for meeting the students undergoing internship, recruitment possibilities are discussed. Besides, whenever faculty meets possible recruiters either in conference or seminar held at IIT or outside placement possibilities are discussed.

9.3 Mechanism of obtaining industry feedback and the findings.

The department organised a round table discussion with the industry on various aspects related to curriculum. The minutes are attached. (Annexure III)

9.4 Alumni feedback mechanism and its outcome.

Alumini meet is organized each year under the aegis of Antarang. In addition they are also called for delivering lectures . TTV 701 & 702 courses ar taught by alumni and also TTR 310

9.5 Placement records – Ph.D., M.Tech. and B.Tech..

For this refer section 1.3 h . However, some students opt for higher studies in the country or outside or get placed from their or the efforts of the faculty

10. Vision for next 5-10 years

10.1 Goals and benchmarking for future in relation to (i) curricula, (ii) research, (iii) outreach, and (iv) processes for regular internal assessment.

The Department of Textile Technology enjoys the unique status and position in the country, being the only such department in the IIT System which offers courses in undergraduate, post graduate and Ph. D. levels. The department and its curriculum has in fact been the bench mark for various colleges and university of the country that offer UG and PG programmes. A large number of our graduates are serving as faculty in these institutions. Theoretically speaking, with in the country, it can bench mark only itself.

(i) Curricula

Department has been modifying its curricula time to time taking into account the need of the industry and the advancements in science and technology in this area.

(ii) Research

The department is known in the country and outside as the respectable research hub, with a large number of foreign visitors to the department, International MoUs, and visits of our own faculty members to various countries either as visiting faculty or for conference presentations, including students exchanges with some of universities.

(iii) Outreach

The department has been organizing CEP and QIP programmes, including seminars, symposia, and workshops and also supporting faculty for upgrading their qualifications by enrolling in M. Tech. or Ph. D. Programmes. We do plan to use technology tools to conducts such programmes to enhance the reach and effectiveness.

(iv) Processes for regular internal assessment.

Through its Faculty Board and Department Research Committee, the department reviews its curricula and academic decisions including admissions almost every semester. However, major revision of curricula for different programmes happens along with the institute. The minor revisions however are part of a continuous process.
The meeting of lab-in-charges and intra-lab discussions time-to-time with staff and students is an effective feedback mechanism. Separate meetings with research scholars, PG / UG students through class committees and through special course advisors particularly for the academically weak students are held.

We propose to do a serious biannual internal assessment of the academic issues including the research outputs and outcomes.

10.2 Vision of curricula and teaching-learning processes - UG, PG and Ph.D.; innovations proposed.

Student strength: In keeping with the institute's vision of increasing the quality and quantity of research output, the department feels that the present ratio of PG: UG strength at the department which is around 1:4, should be increased to around 1:1 to strengthen the research activities. It is proposed that the current UG strength should be reduced to 60 and PG students' strength, including Dual Degree and Ph. D. to be increased accordingly. Some of the details are in the other sections including use of ICT for dissemination and award of certificates and degrees.

10.3 Areas identified for improvement in (i) curriculum, (ii) teaching-learning processes.

The undergraduate curriculum is currently being modified to reduce class room based teaching (the credits are being reduced to 145 from the existing 180), facilitate flexibility students, including allowing minor two area specialization, viz., Technical Textiles and Management of Textile Business, and introduction of non-graded courses.

Attempts will thus be made to redesign the course curriculum to facilitate the reduction of class-room teaching to make more time available to faculty for research.

10.4 New areas for research and Masters programme, and industry participation in these.

Post Graduate Programmes: Considering the need of the industry and the thrust of Ministry of Textile, Govt. of India, the department considers that the existing Master's programme be modified suitably and new programmes be introduced. In this respect the following is proposed

Existing Textile Engineering, M. Tech programme will have specialization options in the following areas:

- Textile Technology
- Technical Textiles &
- Apparel Technology

The first year of all the students would have common courses while 3rd and 4th semester's courses will be under the above mentioned specialization including the major projects.

The other M. Tech. Programme in Fibre Science and Technology would be retained, being the only such programme in the country.

New M. Tech. in Textile Chemical Processing will be introduced. This is based on the current shortage of professionals in this area. Recent round table meet with the industry also emphasized the need

Research: The department considered that in the next decade the focus should be more on group (inter and intra) research in the following areas

- Focus research areas
  - Performance textiles
  - Engineered textile structures
  - Green technology
  - Advanced textile materials
- Technical textiles
  - Protective
  - Composites
  - Health & hygiene
  - Industrial
- Socially and industrially relevant research

10.5 Projections for (i) funded projects, (ii) journal publications.

The faculty members of the Department have been very active in research in the various areas of interest, as mentioned in the above section and have regularly been submitting projects to various funding agencies, in India and abroad, and are encouraged to do so. On an average, 2-3 research projects forwarded by the DRC every month. The constraint if any is the space available for the equipment they propose, as the department would not like to be in a situation where the faculty member is put in a difficult situation after the projects gets sanctioned. We hope that the new engineering block comes up soon, we are waiting for the same for almost a decade, whereby space rationalization for research in different areas could be done with some space earmarked for new projects / areas, some of which could be reallocated once the project is over

As far as the publications, the department has a decent record of publications and we hope to maintain 4 or more publications in reputed journals per faculty per year.

10.6 Projected graduation numbers - Ph.D., M. Tech. and B. Tech.

We expect to double the number of the Ph. D. graduating out from the department, but this would also depend on the number getting admitted. To increase the pool department has proposed MS (R). It will also do enough publicity the possible catchment informing about the current research activities of the department including making visits to such institutes. Currently too, department engages students and faculty under summer research and faculty fellowship awards as per the rules of the institute. In addition to above the department would create a publicity cell. The abstract of the papers that the faculty publishes may be compiled and sent electronically to the teaching and research institutes across the globe as well as textile and allied industry once in a semester.

We would like to increase the PG students (including, new M. Tech., MS (R), the Dual degree MBA students) to double the current strength.

However, the department would like to reduce the UG strength.

10.7 Projected faculty profile, and areas for recruitment of faculty.

The department is truly an interdisciplinary in nature which faculty having diverse backgrounds such as chemistry, polymer science, physics apart from the backbone textile technology and textile chemical processing. The department has been actively searching for the faculty in the areas where superannuation has caused vacancies or likely to cause vacancies including newer areas of research. The department has been trying to induct faculty to enrich the areas of Management, Instrumentation/electronics/ electrical engineering, Applied mathematics, Mechanics, medical textiles and nano science and technology. Some areas where we are striving to get faculty are fabric manufacture and textile chemical processing (the department proposes to start a PG programme in this area).

Recruitment of Adjunct faculty from India and abroad and joint faculties from other departments within IIT Delhi would be made.

10.8 Projections for future benchmarking (for comparison after 5 years) – institutions in India and abroad, and parameters for future comparison.

Frankly speaking, within the country we don't have any institute who we can bench mark , in fact we are the one who have provided leadership in teaching and research. However, we would be bench marking ourselves with best the US, UK, Europe, China and Australia. In addition we would like to provide leadership across the globe by partnering with various like minded institutes and universities for sharing best practices and working on joint research projects. One of the interesting facts is that manufacturing activities in the area of textiles is diminishing in the developed world and shifting base to India China and other Asian countries, with India enjoying either first or second position. This definitely gives the Department ample opportunities for collaborative research in various areas. The faculty members are already doing joint projects and helping sign MoUs with various universities.

Some of the bench marks for accessing the progress would remain the same as publications in journals and conferences, filing of patents as also developing adoptable technologies and participating in the cutting edge areas, such as smart textiles and polymers and application of nano science and technology. We hope to double the publications as a department in quality journals. Would like to double the transferable technologies by actively partnering with industries.

Development in machine / component design, design of testing equipment, generating newer standards would also remain the focus area of the department. The department envisages a lead role in this area with the support of Ministry of Heavy Industry. The department would like to make a mark in this respect.

10.9 Infrastructure and governance - limiting factors that affect achievement of benchmarks and methods to overcome these.

Like any other department infrastructure plays a significant role. On its part we have been replacing obsolete machinery with newer crisper versions. Other than the conventional laboratories, we would like to a functional product innovation design

lab, which would allow students to explore newer ideas and actually provide them a space always available for creative design activities. This may also inspire a lot to take up entrepreneurial activities later in life.

Department would like to create a separate seamless research space with good ambiance (currently we do not have separate specific research and teaching labs). Considering that a lot of faculty members are exploring new research area and may like bring in specialized equipment, we need to create separate space which temporarily could be allotted till the duration of the project and be vacated later for other projects.

We are definitely constrained by space. We are expecting that the department would be relocated to a newer building (this has been on the cards for now almost a decade)

10.10 Working with other departments/centers and institutions in teaching and research.

As mentioned earlier that his department is truly an interdisciplinary in nature and ahs been collaborating with faculty members from deferent department and centers, such as electrical engineering, applied mechanics , mechanical engineering , biochemical engineering , biomedical engineering, rural development, chemistry, school of biological sciences, polymer science etc. The department would continue to engage itself in this manner.

10.11 New initiatives that the department/centre will undertake.

M.S. (R) programme would be introduced to attract students from diverse disciplines. The department recognizes the interdisciplinary nature of research in this discipline and therefore would work towards increasing the pool of prospective research students by including students from disciplines including bios sciences, physical & chemical sciences, applied mathematics in addition to various engineering branches.

The department wishes to explore a offering New approached to PG programmes, in order to meet the demands of working professionals who generally face difficulty in getting long study leave to pursue full time M. Tech programmes. The department considers that the use of IT and communication tools could be made to award certificates and degrees by on line teaching and learning methods. For this attempts will be made to remodel the existing / new M. Tech. programmes to facilitate awarding on line degrees to working professionals. For example the major project, minor project and laboratory experience could be pursued within the industry which would help faculty in working on the Industry relevant problems.

In addition the department would consider designing special M. Tech / post graduate diploma programmes to suit requirements of a typical industry or industry consortiums for a period of 1 or 2 year duration.

International presence**:** Steps will be initiated to

- Attract students from across the globe at PG & research level
- Attract foreign faculty for short duration
- Increase exchange of students at research level

10.12 Outreach goals and anticipated limitations in the attainment of these.

The QIP and CEP programmes too can be administered using IT Tools. The department would seriously explore these possibilities in addition to the conventional in-house programmes. The department faculty has actively participated in creation of NPTEL courses and would continue to do so.

Recently the department has invited industry for a round table meeting and they had whole-heartedly supported this idea.

- Industry collaboration: Considering that industry relevant research is important for the country various efforts would be made , some of which are listed below:
  - Industrial projects at PG level
  - Online CEP courses
  - PG internship in industry
  - Increasing visibility of the department by

  – Communication/ networking
  – Group emails
  – Conducting seminars/ workshops
  – Participation of industry professionals in academic process
  – Joint projects with industry

10.13 Mechanisms for effective changes based on feedback received and development and implementation of corrective measures.

Apart from the conventional mechanisms for feed back and review, the department would like to get feed back through its website and make the admin more responsive, be it the office of the head, the lab in-charges or the programme coordinators who could get the feedback quickly and respond as per the need.

10.14 Questions to which the department seeks answers from the Review Committee.

We would like it to recognize the departments need for more space, and ambiance associated as also more funds, considering that it is one of its own kind in the country and has to meet the larger expectations of the country and the society.

Department now believes that postgraduate teaching and research would be the pillars of success for achieving its set goals. The country also has many colleges (more than 40) that award the B. Tech. Degree in textiles, it is time that we be allowed to balance UG: PG student ratio by reducing UG student strength. We would like to be a model teaching institute imparting quality education and not the one for generating quantity.

For information, considering the research areas that the department is engaged in and the strength of the faculty, we may like to change the name of the department to “Department of Textile Science and Engineering" and that of the UG programme to "Textile Science and Engineering."

11. Information in public domain

11.1 Minutes of all meetings.
Minutes of all meetings are kept in a file and available to public if required.

11.2 All reports archived in the central/department/centre libraries.
Maintained in the department's office.

11.3 Past vision documents, review documents, Standing Review Committee documents.

Department had a standing review committee. Department is currently not in the possession of the review reports.

11.4 Any other documents developed by the department, a group/section of the department/centre.

- The department has developed a safety manual for safe working of students in the laboratories. (Available in labs and with faculty)
- Also developed is the faculty information brochure (Annexure II)
- Department prepares an annual report every year and it is passed on to the institute for preparation of annual report of the institute.

11.5 Feedback documentation and action taken on the same, and its outcome.
Students' feedback mechanism exists and data and relevant information is available to all concerned in the institute. This data is used for improving teaching learning process and also for other purposes.

ANNEXURE I

Review of the Department

Areas of research (2009-2013)

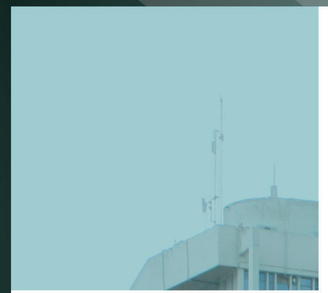
Sl. No.	Name of Res area.	Faculty involved (no)	Ph.Ds		Journal papers	Conference papers	Sponsored projects (nos and Value)		Industrial consultancy (nos and Value)	
			Ongoing	Completed			Completed	In progress	Completed	In progress
2009 -13	Textile products & process	9	11	8	142	95	131.89	91.56	77,04185	10,00000
	Technical textiles	14	16	5	80	70	378.65	653.52	3,14467	
	Medical textiles	5	4	5	77	90	311.22	420.41	7,45050	
	Advanced materials for textile applications	7	12	4	89	85	2012.9	96.18	10,82709	
	Instrumentation & equipments	8	1	-	5	2	166.98	82.42	6,00000	
	TOTAL						**3001.64**	**1344.09**	**104,46411**	
2004 -13	Textile products & process							255.5	1,51,69997	
	Technical textiles							2983.4	13,40646	
	Medical textiles							521.33	8,30050	
	Advanced materials for textile applications							96.18	1,74332	
	Instrumentation& equipments							276.4	11,95334	

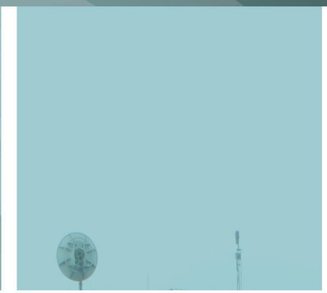
DEPARTMENT OF TEXTILE TECHNOLOGY

भारतीय प्रौद्योगिकी संस्थान दिल्ली

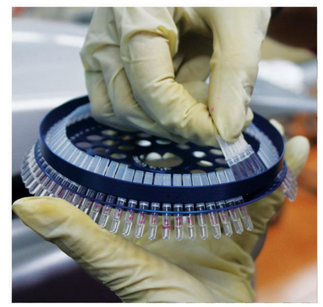
Indian Institute of Technology Delhi

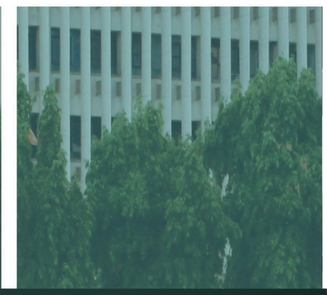
BROCHURE FOR NEW FACULTY APPLICANT












DEPARTMENT OF TEXTILE TECHNOLOGY

INTRODUCTION

The Department of Textile Technology enjoys a special status in the country and has the distinction of being the only textile technology department among all the IITs. This department offers undergraduate, postgraduate and doctoral programmes. It aims to achieve excellence in education in textile technology through continuous up-gradation of textile syllabi, conducting fundamental research in established and emerging technologies as well as applied or developmental research. It closely interacts with the industry and carries out collaborative research on regular basis. It provides highly competent technical manpower to the industry, government, research and development organizations and academic institutions. As a result of careful planning and decades of development, the department has risen to a position of international eminence. It has established international links with reputed institutions for students and faculty exchange and collaborative research. Today it has achieved a pre-eminent status not only in teaching but also in research and technology transfer. Workshops, seminars, schools and symposia are organized from time to time for the benefit of industry and academia under Continuing Education Programme and Quality Improvement Programme. The department is actively involved in helping other textile colleges in setting up laboratories and updating their syllabi.

VISION

- To contribute to India and the world through excellence in scientific and technical education and research
- To serve as a valuable resource for industry and society
- To remain a source of pride for all Indians

MISSION

- To generate new knowledge by engaging in cutting-edge research and to promote academic growth by offering state-of-art undergraduate, postgraduate and doctoral programmes
- To identify, based on an informed perception of Indian, regional and global needs, areas of specialization upon which the institute can concentrate
- To undertake collaborative projects which offer opportunities for long-term interaction with academia and industry
- To develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions

VALUES

- Academic integrity and accountability
- Respect and tolerance for the views of every individual
- Attention to issues of national relevance as well as of global concern
- Breadth of understanding, including knowledge of the human sciences
- Appreciation of intellectual excellence and creativity
- An unfettered spirit exploration, rationality and enterprises

PROGRAMMES

The department offers one 4-year (8-semester) undergraduate programme, two 2-year (4-semester) post-graduate programmes and one doctoral programme, leading to the following degrees respectively

- Bachelor of Technology in Textile Technology
- Master of Technology in Textile Engineering
- Master of Technology in Fibre Science and Technology
- Doctor of Philosophy

RESEARCH INFRASTRUCTURE & FACILITIES

The department has ten fully equipped laboratories with the state-of-art facilities. The laboratories include fibre science laboratory, yarn manufacture laboratory, fabric manufacture laboratory, textile chemical processing laboratory, textile testing laboratory, nonwoven laboratory, protective textile laboratory, smart textile laboratory, medical textile laboratory and computer laboratory. The manufacturing facilities include bicomponent melt spinning, solution spinning, drawing and heat setting, electro-spinning, ring spinning, rotor spinning, friction spinning, weaving and its preparatory machines, warp and weft knitting machines, needlepunching nonwoven line, dyeing, printing, and finishing machines, compression moulding machine and injection moulding machine. The analytical facilities include but are not limited to scanning electron microscope, atomic force microscope, confocal laser dispersion Raman microscope, x-ray scattering, thermal systems, gel permeation chromatograph, solid state NMR, rotational rheometer, high volume instrument for fibre testing, universal tester equipped with video extensometer, Kawabata evaluation system, fabric feel tester, capillary flow porometer, air filtration test rig, sweating guarded hot plate, impact tester and gravimetric absorption testing system.

AREAS OF CURRENT RESEARCH

The department is engaged in fundamental & applied research on traditional as well as emerging areas of textiles. The research areas include nanofibres, nanofinishes, technical textiles, medical textiles, smart textiles, electro-conductive textiles, tissue engineering, nonwovens, composites, structure & mechanics of fibrous assembly, clothing comfort, natural and synthetics dyes, modelling and simulation, machine and instrument design, and product & process development.

USEFUL INFORMATION
HIRING PROCESS

INFORMAL APPLICATION PROCESS

Interested candidates are encouraged to send their resume to the Head of the Department. The department would respond on phone or by e-mail and invite them for an interactive lecture session, whenever they are in India/Delhi to explore teaching and research opportunities.

FORMAL APPLICATION PROCESS

Institute invites application for the position of Assistant Professor throughout the year. Candidates may apply online any time of the year.

Step 1: The institute receives applications from the interested candidates.
Step 2: The candidates are short-listed.
Step 3: The short-listed candidates are called for presentation and interview on a scheduled date.
Step 4: The appointment letters are issued to the successful candidates.

QUALIFICATIONS

IIT Delhi invites application from exceptionally bright and motivated persons with outstanding academic background. Applicant should have PhD in engineering with research/teaching experience in areas broadly related to textiles.

DUTIES AND RESPONSIBILITIES

The selected faculty members are required to demonstrate excellent teaching and research capability. They should be able to teach a wide range of subjects, carry out academic and sponsored research work, execute consultancy work, and handle a modest amount of administrative work.

POST

The post of a newly joined faculty member is permanent, but the appointment against the same will be on probation for a period of one year, which can be extended. For candidates having teaching & research experience of less than three years, contractual position may be offered initially.

PAY AND ALLOWANCES

The faculty members are paid as per the sixth pay commission of Govt. of India. At the beginning of the scale, the Basic Pay and Grade Pay are Rs. 30,000 + Rs. 8,000 per month. To this, DA is added @ approximately 65% of Basic and Grade Pays as of January, 2012. In addition, certain other benefits and incentives are provided along with other allowances. A newly joined faculty may expect a pay of approximately Rs 66,000 per month.

BENEFITS AND INCENTIVES

HOUSING

The members of the faculty are entitled to on-campus housing, when available, for which a nominal license fee is charged. Those who opt to stay off-campus would be entitled to "house rent allowance" @ 30% of Basic Pay + Grade Pay.

MEDICAL COVERAGE

The members of the faculty and their dependent family members are provided with medical facilities and services available in its on-campus hospital. The latter has out-patient consultation with doctors, limited in-patient care, limited tools for diagnosis, and a well-stocked pharmacy. In cases where the hospital is not in a position to provide necessary medical care, patients are referred to other specialists or to recognized hospitals in and around Delhi. A part of expenses incurred on such treatment is reimbursed. The institute has a group insurance policy which is open to all staffs of the institute.

RETIREMENT BENEFITS

The members of the faculty who have joined (or join) after Jan 1, 2004 are entitled to "New Pension Scheme (NPS)", wherein IIT as well as the faculty member each contribute 10% (Basic Pay plus Grade Pay) of member's salary to the fund. While the fund earns a fixed return each year, the accumulated fund may be accessed when the faculty member retires, or in a financial emergency. (Those who have worked elsewhere in the Government or in a Government-sponsored organization prior to joining IIT and have subscribed to a "pension-cum-gratuity" scheme may continue with that option.)

LEAVE TRAVEL CONCESSION

As with other Government employees, the members of the faculty are entitled to "leave travel concession", wherein the institute underwrites the travel expense to one's home town every two years. Alternatively, one can travel once to visit home and once to any place in India, in a block of 4 years. This travel support is provided to all dependent family members as well.

REIMBURSEMENT OF TELEPHONE BILLS

IIT reimburses expenses incurred on use of telephone at residence up to Rs. 1500 per month.

SUBSIDIZED LOANS FOR HOUSING, CAR AND COMPUTER

Again, as with Government employees, IIT makes available limited amount of loans to buy/build a house, or to buy a car or a computer for one's personal use on interest rates notified by the institute for such loans.

SABBATICAL LEAVE

Every seventh year (limited to 3 times in entire service), a faculty member may take one year sabbatical leave with full pay. During the year, he/she may engage in research or development or in teaching at a university or industry in India or abroad. The essential requirement is that the engagement must lead to enrichment of one's knowledge or experience in the field of one's specialization. He/she is required to execute a Bond to serve the Institute for a minimum period of three years after joining duty after the sabbatical leave.

OTHER LEAVE OPPORTUNITIES

Other than sabbatical leave, a faculty member is entitled to various kinds of leave, including leave during summer/winter vacation periods, leave to cover medical treatment, special leave for participation in meetings, conferences, etc., or E.O.L. (un-paid leave) to take up a limited-term assignment with industry or another university. Female faculty are entitled to maternity leave for up to 6 months and paid child care leave for a maximum period of 2 years in their entire service for taking care of up to two children.

CHILDREN EDUCATION ALLOWANCE

Under Children Education Allowance Scheme, reimbursement can be availed by faculty members annually up to Rs. 15000 per child subject to a maximum of 2 children.

FEATURES TO HELP YOU SETTLE-IN

REIMBURSEMENT OF EXPENSES FOR INTERVIEW

The institute reimburses expenses made towards travel within India by a faculty member candidate to attend an interview with the Department and/or Selection Committee. The expenses are reimbursed to the extent of II-AC train fare.

REIMBURSEMENT OF EXPENSES TO JOIN IIT DELHI FROM WITHIN INDIA

The institute reimburses expenses incurred towards travel from within India to join IIT as a member of the faculty. A sum of Rs. 100,000 at the most, is reimbursed towards expenses incurred on travel by him/her along with his/her family and for transportation of house-hold goods. The mode of transportation etc. is, however, subject to Government of India guidelines.

REIMBURSEMENT OF EXPENSES TO JOIN IIT DELHI FROM ABROAD

The institute reimburses expenses incurred towards travel from abroad to join IIT as a member of the faculty. Expenses incurred on travel by him/her and his/her family and for shipment of house-hold goods, but limited to Rs. 100,000, are reimbursed. The mode of transportation etc. is, however, subject to Government of India guidelines.

INITIAL GUEST HOUSE STAY FACILITY

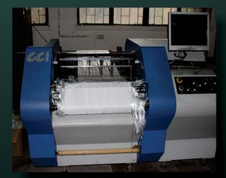
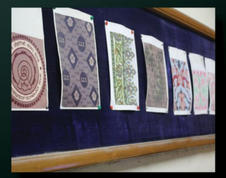
The faculty and his/her family are entitled to stay in the institute guest house with free lodging (boarding charges to be paid by the faculty member) for up to 2 weeks till a suitable on-campus house is identified and allotted to him/her.

INITIAL EQUIPMENT GRANT FOR OFFICE/LAB EQUIPMENT

The institute makes available up to Rs. 100,000 in the form of an equipment grant to help faculty settle down with necessary equipment, including a PC and printer, for use by him/her in the office or a lab.

It is re-emphasized that the above information are subjected to certain terms and conditions, eligibility criteria, guidelines and procedures.



RESOURCES TO HELP GROW PROFESSIONALLY

RESEARCH GRANT TO PROCURE EQUIPMENT & SUPPLIES

A new faculty is entitled to seek a research grant from IIT of up to Rs. 10,00,000 to develop the necessary research facility in the area of his/her expertise. The faculty members are encouraged to apply for funding of their research work to various government and non-government agencies.

PROFESSIONAL DEVELOPMENT ALLOWANCE (PDA)

Starting from 1st April, 2010, Rs. 300,000 is made available to each faculty member for a block of 3 years to support the followings:

- Attending international conferences/symposia
- Attending national conferences/symposia
- Purchase of books and other contingent items
- Membership of Professional Societies

This can be augmented through sources like sponsored research projects directly obtained by the faculty member.

SOURCING & MANAGING FUNDS FOR R&D PROJECTS

The institute helps the faculty to seek and manage research projects and consulting assignments from industry and from funding agencies in India and abroad. The institute also facilitates transfer of technology to industry and to file patent applications in India and/or abroad.





CONTACT US:

PROF. R. CHATTOPADHYAY
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ANNEXURE III

Minutes of the Curriculum Workshop

Department of Textile Technology

Minutes of the Curriculum Workshop held in the Department on 4th June 2013 with the Industry participants, in the Department of Textile Technology, IIT Delhi.

The following attended

S. NO.	NAME	DESIGNATION, ORGANIZATION
1.	Mr. THOMAS VARGHESE	BUSINESS HEAD, TEXTILE, SOUTH ASIA, ADITYA BIRLA G ROUP
2.	Mr. PARAG PATIL	GM, GRASIM INDUSTRIES, ADITYA BIRLA
3.	Mr. AMBRISH MAHESHWARI	CEO, ACRYLIC FIBRE BUISINESS, ADITYA BIRLA, GROUP, THIALAND
4.	Mr. SWAPAN S NATH	EX. DIRECTOR, WELLSPUN GLOBAL BRANDS LTD, MUMBAI
5.	Mr. SANDESH KADAM	SITE PRESIDENT, SIWASA, RELIANCE INDUSTRIES
6.	Mr. S S SAJAL	PRESIDENT, BANSWARA SYNTEX LTD, RAJASTHAN
7.	Mr. A K BASU	DIRECTOR, VARDHMAN, BADDI
8.	Mr. RAJIV MEHANI	VARDHMAN GROUP
9.	Mr. HARISH CHATTERJEE	VICE PRESIDENT MANUFACTURING, RAYMONDS LTD
10.	Mr. S K CHAUDHURI	CONSULTANT
11.	Mr. SHRUTI AGARWAL	ADITYA BIRLA GROUP
12.	PROF. KUSHAL SEN	FACULTY
13.	PROF. S M. ISHTIAQUE	FACULTY
14.	PROF. V. K. KOTHARI	FACULTY
15.	PROF. R. CHATTOPADHYAY	FACULTY
16.	PROF. A. K. AGRAWAL	FACULTY
17.	PROF. BHUVANESH GUPTA	FACULTY

18.	PROF. R. S. RENGASAMY	FACULTY
19.	PROF. MANJEET JASSAL	FACULTY
20.	PROF. MANGLA JOSHI	FACULTY
21.	DR DIPAYAN DAS	FACULTY
22.	DR BHANU NANDAN	FACULTY
23.	DR SOURABH GHOSH	FACULTY

Prof. R Chattopadhyay, Head of the department, welcomed the participants and gave a brief presentation on the current academic and research activities of the department. To initiate the discussion, Prof. Kushal Sen gave the glimpse of the current PG and UG programmes and based on the note circulated to the participants, put on the table the proposed new programmes and modifications in the existing programmes as also the delivery mechanisms to make the academic programmes more relevant to the industry.

The recommendations of the workshop are recorded below.

1. **Post graduate programmes**

   The structure of the current M. Tech. programmes, i.e., Textile Engineering and Fibre Science and Technology, were shared and the proposal for starting new programmes based on the felt need were tabled, namely

   a) Textile Chemical Processing
   b) Technical Textiles

   The house was of the view that that there is a dearth of technical manpower in these two areas and considering the big impetus that the Ministry of Textiles is giving to promote and help the growth of technical textile industry in India, these two programmes are very relevant in the current context. It was the considered opinion of the group that the department should make efforts to start these programmes as soon as possible.

   The following are some of the views of the industry partners as captured on this issue.

   Mr. Ambrish Maheshwari suggested that M.Tech. in technical textiles could focus on various specializations and a bouquet of 10-12 credits could be offered from those specialization. He also suggested that industry should be made aware about the rigorous selection process being followed for selection of PG students at IIT Delhi. Dr. S K Choudhuri suggested that a specialization in retail is the order of the day and also of the opinion that a special focus should also be given on fibres such as wool. Mr. Harish Chatterjee did specifically favored M.Tech. in textile

chemical processing. Mr. Rajiv Mehani suggested that specialization in spinning, weaving, garment, apparel technology could also be considered and emphasized that there should be more interaction between industry and IIT. Mr. Parag Patil was of the opinion that there should be more research based credits and also that PG students should work on industry projects for a semester.

Finally Mr. Thomas Varghese summarized the discussion and concluded that the two courses proposed indeed are relevant for the industries. He stresses that the courses should be designed so that they are more industry specific.

Use of ICT for award of PG degree

Considering that there are a good number of employed professionals in the Textile Industry, who may be interested in upgrading their technical qualifications but are not in a position to take leave for two years/ or the industry cannot give the study leave for a long period. We may like to experiment with online teaching learning using video conferencing facilities by designing a credit based flexible curriculum and with a remodeled lab experience to include industry based mini, minor and major projects. For evaluation purposes, the candidate would have to come to IIT Delhi as per the need.

Its success would depend on whether the industry would consider providing facilities to their employees to learn after working hours and to do projects in their organization relevant to the industry. If yes, it should be a win-win situation for all the three stake holders.

The following are the thoughts captured on this issue

The industrial participants welcomed the offer for such course. Following was the individual views expressed. Mr. Ambrish suggested for more face to face interactions in such courses. Mr. Sandesh Kadam suggested that there should be mentorship from the industry side too. Mr. Thomas Varghese emphasized that these courses could include product development, process design components in the curriculum itself.

Short-term courses through ICT

In the same spirit as above, specifically designed courses of short duration, (1, 2, or 3 week duration) could be delivered using ICT, giving relevant credit for the same.

The participants from the industry unequivocally supported this idea.

Master of Science –Research [MS(R)]

This essentially was proposed to be a two year programme where research / project component would be more and teaching component would be less just sufficient to initiate the student in the field of textiles or the relevant research area.

The department has been mulling over this for quite sometime now. The textile research and technology is actually very multidisciplinary in nature. Today therefore, persons with varying backgrounds need to be trained in the areas of textile research which encompasses , basic sciences including biosciences, CS, IT, ICT, ECE, mechanical engineering, chemical engineering, etc. besides textiles. Considering in the coming decades the industry and various research organizations would be interested in developing disruptive technologies and Indian organizations would be engaged more in the creation of IPR, such type of human resource would be a boon.

While the industry participant were appreciative of this novel programme, however they suggested that for his programme more feedback should be taken from R & D institutes.

UNDER GRADUATE PROGRAMME

The department currently runs one 4-year B. Tech. Programme in Textile Technology. The participants were informed of the philosophical changes the institute is contemplating in the UG curriculum is to introduce greater flexibility and to encourage creativity for preparing the graduates to take up challenging tasks as they graduate out. Some of the key features of the new programme are:

a) Reduce the credits for the basic degree (~ 145 from the current 180)
b) Provide opportunity to the student to do two do two minor areas of 20 credits each (one in textile specialization and the other in outside the textile department, such as CS, Management, etc., these however are non-mandatory)
c) The textile specialization proposed were
    a. Technical and Innovative textiles
    b. Textile Business and Management

d) Also give the student enough flexibility to do creative design and extension based activities including industrial training – compulsory flexible non-graded credits- the experience would start from the first year itself. The Non-graded basket could have
    a. Introduction to engineering and programme
    b. Design of textile products
    c. Professional practices
    d. Process design and improvement
    e. Machine design
    f. Product analysis and reverse engineering
    g. Internship (40 days , one semester, two semester)

e) Dual degree B. Tech +(M. Tech., MBA, Ph. D.)

The institute would encourage students to seamlessly do higher degrees if they so desire.

The industry participants overwhelmingly appreciated the dual degree programmes, particularly that would offer B. Tech. and MBA. They opined that the current undergraduate students have very little information on how to manage the industry and business. This definitely would be a great value addition.

EMPLOYMENT ISSUES

This always remains a burning issue as to where do the students graduating from IIT Delhi should be gainfully employed including the roles and responsibilities that commensurate with the qualifications and skill sets.

Although the participants agreed that the IIT students have very high potential, however, did not have a clear solution to this problem. Nevertheless they felt that greater interaction with industry should help create special positions for the UG, PG, and Dual degree students from IIT Delhi. The industry too is currently increasing its remunerative structure to make it more attractive to new entrants.

The meeting ended with an assuring note from the Head of the Department, Prof. Chattopdhyay thanking the captains of the industry and hoping for cooperation from them in future too.