K.S. Rangasamy College of Technology

(Autonomous)

Curriculum & Syllabus

of

M.Tech. Textile Technology

(For the batch to be admitted in 2023 – 2024)

R 2022

Courses Accredited by NBA, Accredited by NAAC A++ Grade
Approved by AICTE, Affiliated to Anna University, Chennai.

KSR Kalvi Nagar, Tiruchengode – 637 215.
Namakkal District, Tamil Nadu, India.

Passed in BoS Meeting held on 11/05/2023
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

Dr. G. KARTHIKEYAN, B.E., M.Tech.,Ph.D
Professor and Head
Department of Textile Technology
K.S.Rangasamy College of Technology
Tiruchengode-637 215

Department of Textile Technology

VISION

To be the centre of excellence in textile education, training, research and service.

MISSION

- To enlighten the students about the latest technology in textile industries through innovative educational practices and multi-disciplinary approach.
- To engage with the industry as solution providers through consultancy.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: **Manufacturing Technique and Solutions to Problems**: Graduates are professionally competent in textile manufacturing technique and be able to identify problems and suggest suitable solutions.

PEO2: **Scientific Research Tools & Technology**: Graduates follow scientific and technological developments, to conduct research and prepare the technical reports.

PEO3: **Interdisciplinary Skills and Entrepreneurship**: Graduates will exhibit interdisciplinary skills that results in desired textile products in their career and develop entrepreneurial culture.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

PO1: An ability to independently carry out research /investigation and development work to solve practical problems

PO2: An ability to write and present a substantial technical report/document

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) WITH PROGRAMMEOUTCOMES (POs)

The M.Tech. Textile Technology Programme Outcomes leading to the achievement of the Program Educational Objectives are summarized in the following table.

Programme Educational Objectives	Programme Outcomes		
	PO1	PO2	PO3
PEO 1	3	3	2
PEO 2	2	3	2
PEO 3	3	2	3

Contributions: 1- Low, 2- Medium, 3- High

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Curriculum

SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 PTT 101	Advanced Short Staple Spinning Technique	PC	3	3	0	0	3
2.	60 PTT 102	Process Control and Fabric Engineering	PC	3	3	0	0	3
3.	60 PTT 103	Quality Analysis of Textiles and Clothing	PC	3	3	0	0	3
4.	60 PTT 104	Statistical Application in Textile Engineering	PC	5	3	2	0	4
5.	60 PED 001 \ 60 PDB E26	Research Methodology and IPR	PC	3	3	0	0	3
6.	60 PTT E**	Professional Elective I	PE	3	3	0	0	3
7.	60 PAC 001	English for Research Paper Writing	AC	2	2	0	0	0
PRACTICALS								
8.	60 PTT 1P1	Quality Evaluation Lab	PC	4	0	0	4	2
Total				**26**	**20**	**2**	**4**	**21**

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 PTT 201	Structural Mechanics of Textile Structures	PC	3	3	0	0	3
2.	60 PTT 202	Advances in Chemical Processing	PC	3	3	0	0	3
3.	60 PTT 203	Industrial Textiles	PC	3	3	0	0	3
4.	60 PTT 204	Clothing Comfort	PC	3	3	0	0	3
5.	60 PTT E**	Professional Elective II	PE	3	3	0	0	3
6.	60 PTT E**	Professional Elective III	PE	3	3	0	0	3
7.	60 PAC 002	Disaster Management	AC	2	2	0	0	0
PRACTICALS								
8.	60 PTT 2P1	Textile Product Development Lab	PC	6	0	0	6	3
9.	60 PTT 2P2	Term Paper and Seminar	EEC	2	0	0	2	0
Total				**28**	**20**	**0**	**8**	**21**

SEMESTER III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 PTT 301	Protective Textiles	PC	3	3	0	0	3
2.	60 PTT E**	Professional Elective IV	PE	3	3	0	0	3
3.	60 PTT E**	Professional Elective V	PE	3	3	0	0	3
4.	60 PTT E**	Professional Elective VI	PE	3	3	0	0	3
PRACTICALS								
5.	60 PTT 3P1	Project Work (Phase I)	EEC	12	0	0	12	6
Total				**24**	**12**	**0**	**12**	**18**

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SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
PRACTICALS								
1.	60 PTT 4P1	Project Work (Phase II)	EEC	24	0	0	24	12
Total				**24**	**0**	**0**	**24**	**12**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 72

Note: PE-Professional Core Courses, PE-Professional Elective Courses, EEC-Employability Enhancement Courses, AT- Audit Courses & OE – Open elective courses

PROFESSIONAL CORE (PC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PTT 101	Advanced Short Staple Spinning Technique	PC	3	3	0	0	3
2.	60 PTT 102	Process Control and Fabric Engineering	PC	3	3	0	0	3
3.	60 PTT 103	Quality Analysis of Textiles and Clothing	PC	3	3	0	0	3
4.	60 PTT 104	Statistical Application in Textile Engineering	PC	5	3	2	0	4
5.	60 PED 001 \ 60 PDB E26	Research Methodology and IPR	PC	3	3	0	0	3
6.	60 PTT 1P1	Quality Evaluation Lab	PC	4	0	0	4	2
7.	60 PTT 201	Structural Mechanics of Textile Structures	PC	3	3	0	0	3
8.	60 PTT 202	Advances in Chemical Processing	PC	3	3	0	0	3
9.	60 PTT 203	Industrial Textiles	PC	3	3	0	0	3
10.	60 PTT 204	Clothing Comfort	PC	3	3	0	0	3
11.	60 PTT 2P1	Textile Product Development Lab	PC	6	0	0	6	3
12.	60 PTT 301	Protective Textiles	PC	6	0	0	6	3

PROFESSIONAL ELECTIVES (PE)

SEMESTER I, ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PTT E11	Alternative Spinning Systems	PE	3	3	0	0	3
2.	60 PTT E12	Characterization of Textile Polymers	PE	3	3	0	0	3
3.	60 PTT E13	Medical Textiles	PE	3	3	0	0	3

SEMESTER II, ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PTT E21	Theory of Drafting and Twisting	PE	3	3	0	0	3
2.	60 PTT E22	High Performance and Specialty Fibres	PE	3	3	0	0	3
3.	60 PTT E23	Nano Technology in Textiles	PE	3	3	0	0	3

SEMESTER II, ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PTT E31	Process Control and Optimization in Yarn Spinning	PE	3	3	0	0	3
2.	60 PTT E32	Enzyme Technology for Textile Processing	PE	3	3	0	0	3

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3.	60 PTT E33	Financial Management in Textile Industry	PE	3	3	0	0	3

SEMESTER III, ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PTT E41	Design concepts in High Speed Fabric Formation	PE	3	3	0	0	3
2.	60 PTT E42	Management of Textile Effluents	PE	3	3	0	0	3
3.	60 PTT E43	Textile Reinforced Composites	PE	3	3	0	0	3

SEMESTER III, ELECTIVE V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PTT E51	Control Systems and Automation in Textiles Engineering	PE	3	3	0	0	3
2.	60 PTT E52	Design and Analysis of Textile Experiments	PE	3	3	0	0	3
3.	60 PTT E53	Advances in Textile Printing	PE	3	3	0	0	3

SEMESTER III, ELECTIVE VI

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PTT E61	Filtration textiles	PE	3	3	0	0	3
2.	60 PTT E62	Project Planning and Management	PE	3	3	0	0	3
3.	60 PTT E63	Process Control in Textile Wet Processing	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PTT 2P2	Term Paper and Seminar	EEC	2	0	0	2	0
2.	60 PTT 3P1	Project Work (Phase I)	EEC	12	0	0	12	6
3.	60 PTT 4P1	Project Work (Phase II)	EEC	24	0	0	24	12

AUDIT COURSES (AC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PAC 001	English for Research Paper Writing	AC	2	2	0	0	0
2	60 PAC 002	Disaster Management	AC	2	2	0	0	0
8.	60 PAC 003	Constitution of India	AC	2	2	0	0	0

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SUMMARY

S.No.	Category	Credits Per Semester				Total Credits	Percentage (%)
		I	II	III	IV		
1.	PC	18	15	3	-	**36**	**50**
2.	PE	3	6	9	-	**18**	**25.00**
3.	EEC	-	-	6	12	**18**	**25.00**
5.	AC	AC I	AC II	-	-	**-**	**-**
Total		**21**	**21**	**18**	**12**	**72**	**100**

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60 PTT 101	Advanced Short Staple Spinning Technique

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To enable the students to learn the theory of various operations.
- To learn different stages of yarn spinning.
- To understand the influence of various parameters on quality and productivity of short staple yarn

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Theory of opening and cleaning in spinning preparatory machine, generation of hooks, neps and rectification.
CO2	Wire and roller drafting technology involved, their limitation and scope for improvement.
CO3	Theory of twisted yarn with their effects on quality and productivity.
CO4	Knowledge on different twisting methods.
CO5	Influences of fiber bending on yarn uniformity and their types of levelling.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT 101 - Advanced Short Staple Spinning Technique								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Fibre Dispersion and Cleaning Necessity of fibre-individualization; fibre opening and cleaning in blow-room machinery; forces acting on the fibre during carding operation; the mechanism of fibre dispersion, fibre transfer, short fibre removal and trash removal; entanglement and disentanglement of fibres; theory of hook formation; the new approaches to improve fibre-dispersion in carding operation; mechanism of removal of short fibre, neps and trash in comber.	10
Attenuation and Fibre Straightening Principle of roller drafting and its application in yarn production; ideal drafting; factors affecting drafting force, fibre dynamics during drafting, drafting irregularities and their causes and remedies; amount of draft and draft distribution on strand irregularity; the function of aprons in roller drafting; limitation of apron-drafting and the scope for improvement; mechanism of wire-point drafting and its application in yarn production; merits and demerits of wire-point drafting; comparison of wire-point drafting with roller drafting; influence of fibre- extent on yarn quality; improvement of fibre-extent by carding, drafting and combing actions	10
Twisting Twisted yarn geometry, forces acting on fibre and yarn during twisting, effect of fibre helix angle on strength, parameters affecting optimum twist level; balloon and spinning triangle formation and their effects on yarn quality and productivity; fundamental requirement to create real twist in a strand, mechanism of twisting principles in ring spinning;	8
Twisting Methods separation of twisting and winding actions of yarn; ply twisting, twist balance; modified twisting principles - open end twisting, false twisting, air-jet twisting, air-vortex twisting, up-twisting, two-for-one twisting, hollow-spindle twisting; merits and demerits of modern twisting system.	8
Fibre Blending and Levelling Importance of achieving homogeneous blending in fibre-mix; types of mixing during spinning preparatory process; lateral and longitudinal fibre blending; analysis of fibre blend index values; process parameters of spinning machinery for processing blended material; influence of intermediate product uniformity on yarn uniformity; different methods of levelling adopted during spinning processes.	9
	Hours: 45

Text book(s):

1.	Oxtoby E., "Spun Yam Technology", Butterworths, London, 2000.
2.	Klein W., "The Technology of Short-staple Spinning", The Textile Institute, Manchester. 2010, ISBN: 1870812980.

Reference(s):

1.	Doraiswamy I., Chellamani P., and Pavendhan A., "Cotton Ginning", Textile Progress, Vol. 24, No.2, The Textile Institute, Manchester 1993. ISBN: 1870812484.
2.	Klein W., "A Practical Guide to Combing, Drawing and the Roving Frame", The Textile Institute, Manchester, 1999. ISBN: 1870372287.
3.	Klein W., "A Practical Guide to Ring Spinning", The Textile Institute, Manchester, 1999. ISBN: 1870372298.
4.	Lord P.R., "Yarn Production: Science, Technology and Economics", The Textile Institute, Manchester, 1999. ISBN: 1870372174.

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60 PTT 102	Process Control and Fabric Engineering

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To understand theory of preparation of yarn for fabric formation.
- To impart knowledge on different types of fabric formation techniques
- To understand selection and control of process variables during preparatory and fabric formation.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Knowledge on winding, warping and sizing for weaving preparation process.
CO2	Explain design developments and process parameters during weaving.
CO3	Explain design developments and process parameters during weft knitting.
CO4	Describe technical developments & machine details of Nonwoven machine.
CO5	Advancement in 3D weaving and 3D braiding technique.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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60 PTT 102 - Process Control and Fabric Engineering								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Weaving Preparation Yarn quality requirements - weaving and knitting; winding - yarn faults, quality of splice/knot, knot factor and clearing efficiency, Optimum clearing of yarn; wound yarn package requirements for different weft insertion system and high speed knitting warping; control of ends break in warping, warp beam quality requirements; quality control in size recipe, size pick-up control, yarn stretch control, quality requirements of sized beam – defects and their causes and remedies. Control of productivity in winding, warping and sizing; Waste control in winding, warping and sizing.	9
Weaving Loom accessories – quality requirements and its effects on loom performance; control of cross ends and missing ends. Loom shed productivity control – loom speed, loom efficiency, loom stops. Fabric quality control – fabric defects and their causes and remedies; process control for weaving filament, blend yarn and dyed yarn.	9
Knitting Types of stitches and their influence on knit fabric properties; weft knitting – method of setting the machine, factors affecting the formation of loops in weft knitting, performance of different yarns, Fabric defects- causes and remedies.	9
Non-Woven Quality control in web preparation; Influence of material and process parameters on fabric quality and performance.	9
Unconventional Fabric Formation 3D Fabrics – Structure, Comparison of 2D and 3D fabrics, classifications; Multilayer fabrics – theory, weaving process, fabric properties, applications; 3 D orthogonal weaving – weaving principles, properties and applications; 3D Braiding – 2D braiding, 3 D braiding, multilayer interlock braiding, properties and applications of braided fabric ; concept of 3D multi axial warp knitting.	9
	Hours: 45

Text book(s):

1.	Russel S.J., “Hand book of nonwovens”, Wood head Publishers, Cambridge, England, 2007
2.	Albrecht W., Fuchs K. and Kitteleman W., “Nonwoen fabrics”, Wiley Vch, 2003, ISBN :3- 527-30406-1

Reference(s):

1.	Anadur S., “Handbook of weaving”, CRC Press, London, 2001.
2.	Paliwal M.C. and Kimothi P.D., Process Control in Weaving, 1999, ATIRA Publications
3.	Lord P.R. and Mohamed M.H., “Weaving: Conversion of yarn to fabric”, Merrow, 2005 ISBN: 090409538X
4.	Booth J.E., “Textile Mathematics-Volume 3”, The Textile Institute, Manchester, 2014 ISBN: 090073924X.

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60 PTT 103	Quality Analysis of Textiles and Clothing

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To understand different characteristics of yarns and fabrics
- To understand the effects of fabric characteristics on its end uses
- To test the yarn and fabric samples
- To analyse the various reports generated during quality evaluation of yarns and fabrics
- To interpret the results obtained through these reports for process and quality control.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Use various tools of testing and analysis for the data in order to draw relevant conclusions
CO2	Analysis variants length curves and determination of wave length from spectrum
CO3	Influence of tensile properties on yarn.
CO4	Evaluate comfort and low stress mechanical properties
CO5	Evaluation of fabric properties and influence on fabric appearance.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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60 PTT 103 - Quality Analysis of Textiles and Clothing								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Mass Variation of Textile Strands Depiction of mass variation of textile strands in time and frequency domain; interpretation and significance of U% and CV% for textile strands; classification and analysis of yarn faults created by mass variation	9
Variance Length Curves and Spectrogram of Textile Strands Effect of specimen length and total length on mass variation measurements of textile strands; theory of construction of VL curve; analysis of variance length curves to understand and avoid the introduction of mass variation during the spinning operation; determination of periodic mass variation in the form of spectrogram; determination of theoretical wave length from spectrum; comparison between normal and ideal spectrum; type of faults and their representation in spectrogram; interpretation of super imposed waves in spectrogram	9
Tensile Properties of Yarn Influence of testing factors on yarn tensile properties; measurement and application of yarn modulus; creep and stress relaxation of yarn; significance of estimating minimum yarn strength Mechanism of Fabric Failure Mode of fabric failure – tensile, tear, abrasion, slippage, bursting and fatigue; influence of fibre, yarn characteristics and fabric structure on fabric failure	9
Comfort and Low Stress Mechanical Properties Role of transmission properties on thermal properties and thermal comfort viz., air permeability, water vapour permeability, resistance to penetration of liquid water, resistance to flow of heat and electrical conductivity; low stress mechanical properties during tensile, compression, bending, shear and buckling deformation; influence of low stress mechanical properties of fabrics on fabric handle, tailorability and sewability	9
Fabric Appearance and other Properties Study of fabric appearance in terms of drape, formability, crease recovery, wrinkle recovery and pilling resistance; influence of fibre, yarn characteristics and fabric structure on the fabric appearance; evaluation of fabric properties like dimensional stability, flammability, impact resistance, absorbency	9
	Hours: 45

Text book(s):

1.	BishopD.L.,"Fabrics: Sensory and Mechanical Properties", Textile Progress Vol.26/3, 1994. ISBN:1870812751.
2.	Furter R., "Evenness testing in yarn production: Part I", The Textile Institute,Manchester,1982

Reference(s):

1.	Furter R., "Evenness testing in yarn production: Part II", The Textile Institute, Manchester, 1982
2.	Furter R.,"Strength and elongation testing of single and plyyarns",TheTextileInstitute,Manchester,1985.
3.	Instrumentation in the textile industry", Vol.1; 1996, Instrument Society of America, 1997, ISBN: 1556175973.
4.	KothariV.K., "Progress in Textiles: Science & Technology Vol.1, Testing and Quality Management", 2001, IAFL

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60 PTT 104	STATISTICAL APPLICATION IN TEXTILE ENGINEERING	Category	L	T	P	Credit
		PC	3	2	0	4

Objective

- To understand probability distributions and estimation theory
- To familiarize the students with various methods in hypothesis testing
- To understand the concept of analysis of variance
- To gain knowledge on process control using charts and process capability
- To design of experiments for textile applications.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply discrete and continuous distributions concepts in engineering problems	Remember, Apply
CO2	Test the statistical hypothesis using normal, t and F and chi-square test	Remember, Apply
CO3	Make decisions with minimum error from available data	Remember, Apply
CO4	Study the capability of process and control the process	Remember, Apply
CO5	Design and analysis the experiments	Remember,Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2							2
CO2	3	3	3	3	2							2
CO3	3	3	3	3	2							2
CO4	3	3	3	3	2							2
CO5	3	3	3	3	2							2
3- Strong; 2-Medium; 1-Some												

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember(Re)	10	10	20
Understand (Un)	30	10	30
Apply (Ap)	20	40	50
Analyse (An)	0	0	0
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0
Total	60	60	100

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 PTT 104 - Statistical Application in Textile Engineering								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	2	0	60	4	40	60	100

Objective(s)	• To understand probability distributions • To familiarize the students with various methods in hypothesis testing • To understand the concept of analysis of variance • To gain knowledge on process control using charts and process capability • To design of experiments for textile applications
Course Outcomes	**At the end of the course, students will be able to** CO1: Apply discrete and continuous distributions concepts in engineering problems CO2: Test the statistical hypothesis using normal, t and F and chi-square test CO3: Make decisions with minimum error from available data CO4: Study the capability of process and control the process CO5: Design and analysis the experiments

Probability Distribution and Estimations **Applications of Binomial, Poisson, Normal, t, Exponential and Weibull distributions in textile engineering - point estimates and interval estimations of the parameters of the distribution functions**	**[9]**
Hypothesis Testing **Sampling distribution; significance tests applicable to textile parameters – normal test - t-test - chi-square test - F-test - p-Values - selection of sample size - significance levels with relevance to textile applications - acceptance sampling**	**[10]**
Analysis of Variance and Non-Parametric Tests Analysis of variance for different models - non-parametric tests - sign test - rank test - concordance test	**[8]**
Process Control and Capability Analysis **Control charts for variables and attributes – basis – development – interpretation - sensitizing rules - average run length - process capability analysis**	**[9]**
Design and Analysis of Experiments 2^k full-factorial designs - composite designs - robust designs - development of regression models - regression coefficients - adequacy test - process optimizations.	**[9]**
Total Hours: 45 + 15(Tutorial)	**60**

Text book(s):

1.	Montgomery D.C., "Introduction to Statistical Quality Control", John Wiley and Sons, Inc., Singapore, 2019
2.	Leaf G.A.V., "Practical Statistics for the Textile Industry, Part I and II", The Textile Institute, Manchester, 1984

Reference(s):

1.	Douglas C. Montgomery, "Design and analysis of experiments", John Wiley & Sons, Inc, Singapore, 2019
2.	Ronald D. Moen, Thomas W. Nolan, Lloyd P. Provost, "Quality improvement through planned experimentation', McGraw-Hill Publications, 2012
3.	Nagla J.R., "Statistics for Textile Engineers", Wood head Publishing India Limited, New Delhi, 2015
4.	Hayavadana J., "Statistics for textiles and apparel management", Wood head Publishing India Limited, New Delhi, 2012

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Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Probability Distribution and Estimations**	
1.1	**Applications of Binomial distribution in textile engineering**	1
1.2	Applications of Poisson distribution in textile engineering	1
1.3	Applications of normal distribution in textile engineering	1
1.4	Applications of t distribution in textile engineering	1
1.5	Applications of exponential distribution in textile engineering	1
1.6	**Applications of Weibull distributions in textile engineering**	1
1.7	**Point estimates of the parameters of the distribution functions**	2
1.8	Interval estimations of the parameters of the distribution functions	1
1.9	Tutorial	3
2	**Hypothesis Testing**	
2.1	**Sampling distribution and significance tests applicable to textile parameter**	1
2.2	normal test	2
2.3	t-test	2
2.4	Chi-square test	2
2.5	F-test	1
2.6	p-values and selection of sample size and significance levels with relevance to textile applications	1
2.7	**Acceptance sampling**	1
2.8	Tutorial	3
3	**Analysis of Variance and Non-Parametric Tests**	
3.1	**Analysis of variance for different models**	4
3.2	**Non-parametric tests - sign test,**	2
3.3	Rank test	1
3.4	Concordance test	1
3.5	Tutorial	3
4	**Process Control and Capability Analysis**	
4.1	Control charts for variables	3
4.2	Control charts for attributes	2
4.3	Basis, development, interpretation, sensitizing rules	1
4.4	Average run length	1
4.5	Process capability analysis	2
4.6	Tutorial	3
5	**Design and Analysis of Experiments**	
5.1	2^k full-factorial designs	2
5.2	Composite designs	1
5.3	Robust designs	1
5.4	Development of regression models	1
5.5	Regression coefficients	2
5.6	Adequacy test	1
5.7	Process optimizations	1
5.8	Tutorial	3
	Total	60

Course Designer

Mrs.S.SRIPADMA – sripadma@ksrct.ac.in

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60 PED 001 \ 60 PDB E26	Research Methodology and IPR

Category	L	T	P	Credit
PC	3	0	0	3

Objective(s)

- To understand the principles of research process.
- To develop knowledge in analytical skills for collection of research data.
- To understand the procedure in the preparation of reports.
- To accomplish basic idea about the process involved in intellectual property rights.
- To enlighten the process of patent filing.

Pre-requisite

Nil

Course Outcomes

On the successful completion of the course, students will be able

CO1	To understand the research process and design.
CO2	To gain the knowledge about sources and collection of research data
CO3	To understand the procedure of data analysis, preparation of reports and checking plagiarism
CO4	To gain the knowledge on Trade mark and functions of UNESCO in IPR
CO5	To enlighten the benefits, E-filing and Examinations related to patents

Mapping with Programme Outcomes

COURSE NAME	CO	PO						PSO		
		1	2	3	4	5	6	1	2	3
Research Methodology and IPR	CO1	3	3	2	2	2	2	3	1	3
	CO2	3	3	2	2	2	2	3	1	3
	CO3	3	3	2	2	2	2	3	1	3
	CO4	3	3	2	2	2	2	3	1	3
	CO5	3	3	2	2	2	2	3	1	3

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

Assessment Pattern

Bloom'sCategory	Continuous Assessment Tests (Marks)		Model Exam (Marks)	End Semester Examination (Marks)
	1	2		
Remember	10	10	20	30
Understand	20	20	40	30
Apply	30	30	40	30
Analyse	0	0	0	10
Evaluate	0	0	0	0
Create	0	0	0	0

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 PED 001\60 PDB E26 - Research Methodology and IPR								
Common to all Branches								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	30	3	40	60	100

Research Design Overview of research process and design- Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys, Selection of the Right Medium and Journal for publication, Translation of Research	[9]
Data Collection and Sources Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying.	[9]
Data Analysis and Reporting Overview of Multivariate Analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation. Checks for Plagiarism, Falsification, Fabrication, and Misrepresentation	[9]
Intellectual Property Rights Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.	[9]
Patents Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents.	[9]
Total Hours	45

Text Book(s):

1.	David I. Bainbridge, “Intellectual Property”, Longman, 9th Edition, 2012.
2	Cooper Donald R, Schindler Pamela S and Sharma JK, “Business Research Methods”, Tata McGraw Hill Education, 11e (2012).

Reference(s):

1.	Chawla H S., “Introduction to Intellectual Property Rights”, CBS PUB & DIST PVT Limited, INDIA, 2019.
2.	Catherine J. Holland, “Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets”, Entrepreneur Press, 2007
3.	David Hunt, Long Nguyen, Matthew Rodgers, “Patent searching: tools & techniques”, Wiley, 2007
4.	Arun K. Narasani, Kankanala K.C., Radhakrishnan V., “Indian Patent Law and Practice”, Oxford University Press, 2010.
5.	Richard Stim, “Patent, Copyright & Trademark - An Intellectual Property Desk Reference”, NOLO Publishers, 2020.
6.	The Institute of Company Secretaries of India, Statutory body under an Act of parliament, “Professional Programme Intellectual Property Rights, Law and practice”, September 2013.

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60 PTT 1P1	Quality Evaluation Lab

Category	L	T	P	Credit
PC	0	0	4	2

Objective

- Characteristics of textile materials and their related models to describe their properties.
- Conducting experiments to characterize the polymers and fibres

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate the ability to choose methods appropriate to research proplem.
CO2	Develop skills in qualitative and quantitative data analysis, write report and presentation
CO3	Knowledge on national and international intellectual property rights.
CO4	Knowledge on Patent information and Rights
CO5	Enlighten the new development in IPR

K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT 1P1 – Quality Evaluation Lab								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	0	0	4	60	2	60	40	100

1. Analysis - FTIR and NMRgraphs
2. Determination of residual formaldehyde in fabrics
3. Evaluation of Flame retardant finish
4. Evaluation of Water repellent finish
5. Determination/ Analysis of contact angle for porous substrates
6. Physical characterization of special Textile structures (Woven/Knitted)
7. Chemical characterization of special Textile structures (Woven/Knitted)
8. Hypothesis Testing and Significance Testing
9. Optimisation Technique
10. Regression Analysis

Hours:60

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60 PTT 201	Structural Mechanics of Textile Structures

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- The structure of ideal and real yarn, migration of fibres in the yarn, breakage mechanism of yarn, mechanics of blended yarns and relationship between structure and property of yarns.
- Geometrical properties of fabrics and its relationship with the mechanical properties of fabric and
- Theory and evaluation of fabric hand.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Analyses of yarn structure and measurements of various parameters and fundamental research works in this area
CO2	Knowledge on fiber migration and their characteristics
CO3	Knowledge on yarn characteristics and blending mechanism
CO4	Understand the anatomy of woven structure
CO5	To know the bending deformation of woven

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 PTT201 - Structural Mechanics of Textile Structures								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Yarn Geometry and Packing of Fibers in Yarns Idealized helical yarn structure; yarn count and twist factors, twist contraction; Limits of twist. Idealized packing; measurement of packing density and radial packing density of yarn; Packing in actual yarns; Specific volume of yarns; measurement of yarn diameter.	9
Fibre Migration Migration characteristics in continuous filament and spun yarns. Effect of various parameters on-migration. Effect of migration on Tensile behaviour and hairiness of the yarn.	9
Yarn Mechanics and Blended yarn mechanism Effect of fibre properties and their geometrical configuration on the tensile and bending characteristics of yarns properties of yarn. Blend irregularity, concept of elongation balance. Effect of properties of constituent fibres and blend composition on behaviour of blended yarn	9
Engineering approach to fabric formation Fibre, yarn and fabric structure property relationships. Crimp interchange in woven fabric. Elastic model for fabric parameters and crimp balance. Concept of fabric relaxation and set. Practical application of geometrical and elastic models.	9
Uniaxial and biaxial tensile deformation of woven fabric Bending deformation of woven fabric, bending behaviour of set and unset fabrics and bending in bias direction. Bending, Shear and drape properties of woven fabric.	9
	Hours: 45

Text book(s):

1.	Schwartz, Peter, ed. "Structure and mechanics of textile fibre assemblies", Woodhead publishing, 2019.
2.	Goswami, B. C., J. G. Martindale and F.L.Scardino, "Textile Yarns: Technology, Structure and Applications", Wiley Interscience, New York, 1985.

Reference(s):

1.	Polona Dobnik Dubrovski (ed.) "Woven Fabric Engineering", Rijeka: Sciyo, 2010.
2.	Hearle, J.W.S., P.Grosberg and S.Baker, "Structural Mechanics of fibres, yams and fabrics", Wiley Interscience, New York, 1969.
3.	Hassan M. Berery., "Effect of Mechanical and Physical Properties on Fabrics Hand", Woodhead publishing Ltd., 2005, ISBN : 13: 978 – 1- 85573 -9185

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60 PTT 202	Advances in Chemical Processing

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To acquire a detailed knowledge about pretreatment.
- To acquire knowledge chemistry of dyeing
- To educate technically the various methods and process of dyeing, printing and finishing.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Knowledge on grey fibres preparations associated with chemical pretreatment
CO2	Understand Kinetic and Equilibrium of dyeing.
CO3	Enumerate developments in dyes and colouration techniques.
CO4	Gain knowledge on printing techniques.
CO5	Gain knowledge on different functional finishes.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60PTT202 - Advances in Chemical Processing								
PTT : M.Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Grey Preparation Single stage grey preparation. Degradation of fibres associated with chemical pretreatment process – degradation of cotton during desizing, scouring, bleaching. Damage of wool, silk, polyester during pretreatment process. Recent developments in pretreatments.	9
Physical Chemistry of Dyeing Kinetic and Equilibrium of dyeing. Adsorption isotherms- Langmuir, Freundlich and "C" isotherms. Determination of dye affinity. State of dye in solutions. Aggregation number-its determination and effect on dyeing. Use of solubility parameter concept in dyeing.	9
Dyeing Natural dyes & their dyeing. Antimicrobial dyes, Water repellent dyes and other fluorine containing functional dyes. Biodegradable dyes. Florescent dyes and phosphorescent colorants. Super critical fluid and CO2 dyeing, IR dyes, Ultrasonic, magnetic dyeing. Redox and low temperature processes. Microencapsulation technology in dyeing.	9
Printing Pigment printing-optical effect pigment, substrate based effect. Digital carpet printing. Sublimation. Thermal inkjet printing- Ink systems, Fabric pretreatments and post treatment, Jet printing machines, Limitations. Transfer printing, Garment printing-chest printing. Evolution of textile printing workflow, New design styles. Steamer.	9
Finishing Use of enzymes in textile finishing - Enzymatic processing of natural fibres - Surface modification and functionalization of synthetic fibres. Comfort and health issues related to functional finishes. Super-hydrophobic nano finishes - Photocatalytic self-cleaning nano finishes - Antimicrobial nano finishes. Coating and Lamination methods.	9
	Hours: 45

Text book(s):

1.	M Gulrajani, "Advances in the dyeing and finishing of technical textiles", The Textile Institute, woodhead publishing, 2013.
2.	A.A. Vaidya, "Chemical Processing of Man-made Fibres and Blends", John Wiley and Sons, New York, 2004.

Reference(s):

1.	Johnson.A., "The Theory of Colouration of Textiles", SDC, Second edition, ISBN: 0901956481.
2.	Chakraborty J N, "Fundamentals and practices in colouration of textiles", The Textile Institute, woodhead publishing, 2009.
3.	Venkataraman, "Chemistry of Synthetic Dyes", Academic Press, London. 2000
4.	H Ujiie, "Digital Printing of Textiles", The Textile Institute, woodhead publishing, 2006.

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60 PTT 203	Industrial Textiles

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To Classify industrial Textiles
- To gain knowledge on transportation textiles and geo textile
- To understand packaging for industrial textiles.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Knowledge on fibers, yarns and fabrics in Industrial textile
CO2	Gain knowledge on production and application on transportation textiles
CO3	Understand the functions and applications of geo textiles
CO4	Understand the properties of textile used in agriculture
CO5	Enumerate in packaging and other industrial textiles applications

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT 203 – Industrial Textiles								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Industrial Textiles Classification, market overview and growth projections of industrial textiles. Technical fibers, yams and fabrics. Coloration, finishing and coating of technical textiles. Filtration textiles - filter fabric requirements, types-dry and wet filtration. Filtration mechanism. Fibers, yam and fabric structures used for filtration. Design of filter fabrics. Finishing treatments. Developments in filter fabrics-melt blown and electro spun lab. filters. Evaluation and standards.	9
Transportation Textiles Automotive textiles-requirement and design for pneumatic tyres, airbags, belts, carpets, sound absorbtion pads and car interiors. Methods of production and properties of textiles used in these applications. Other transportation applications- properties of textiles used in rail aircrafts and marine.	9
Geo Textile Geotextile- functions and application areas of geo textiles Fibres and fabric selection criteria for geotextile applications. Manufacture of woven and nonwoven geotextile Evaluation of geotextile Other civil engineering application - properties of textiles used in civil construction, architectural and ocean engineering application.	9
Agriculture Textiles Textiles in agriculture -requirement and properties of textiles used in crop cover, bird netting, shade fabrics, soil mats and sacks.	9
Packaging and Other Industrial Textiles Requirement and properties of textiles used in food packaging and transport bags. Rope, net, belts, hose and their type, method of production, characteristics and application, Manufacture and properties of textiles used in scrub pads and coated abrasives. Paper machine clothing.	9
	Hours: 45

Text book(s):

1.	Sabit Adanur and Wellington Sear, °Handbook of Industrial Textiles", Technomic Publishing Co, USA, 2008
2.	Horrocks A R and Anand S C, "Handbook of Technical Textiles”., Woodhead Publishers and Textile Institute, England, 2000

Reference(s):

1.	Alagirusamy R and Das A Technical Textile Yarns", Woodhead Publishers, Cambridge, England, 2010
2.	Deopura B L, Alagirusamy R, Joshi M and Gupta B, "Polyesters and polyamides", Woodhead Publisher, England, 2008
3.	Shishoo R, 'Textile Advances in the Automotive Industry', Woodhead Publisher, Cambridge, England, 2008

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60 PTT 204	Clothing Comfort

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To Know about important characteristics of the fabrics
- To differentiate phenomena which take place in the fabric related to the comfort properties of the fabric.
- To know liquid transfer and water absorption through fabrics.
- To analyze the comfort properties of yarns and fibres.
- To understand the physical properties of clothing and comfort of fabrics.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand different phenomena such as wetting, wicking, heat and moisture interaction
CO2	Correlate the property of the fabric with comfort to the wearer.
CO3	Under the concept of moisture transport in clothing.
CO4	Analyze the parameters expressing heat and mass transmission, air permeability.
CO5	Gain knowledge on water holding property, radiation exchange and flammability property

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT 204 - Clothing Comfort								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Concept of Clothing Need and selection of clothing - definition of comfort - components of clothing comfort - Subjective perception of comfort: Psycho-Physiological factors of clothing - Aesthetic concepts of clothing - Various aspects of clothing comfort: thermal comfort - sensorial comfort - body movement comfort. Comfort variables: Thermal and non-thermal comfort variables.	9
Thermal Management in Clothing Human-clothing-environment system - Thermo-regulation in human body - Heat balance - Heat loss - Thermoregulation through clothing system: Heat exchange through clothing. Thermal comfort of clothing - Measurement of thermal transmission characteristics - Parameters for expressing thermal characteristics - Effect of body motion and wind.	9
Moisture Management in Clothing Moisture transport - Liquid water transfer: wicking and water absorption - Principles of moisture vapour transfer - Evaluation of moisture vapour transmission - Factors affecting heat and mass transfer through fabrics- Parameters expressing heat and mass transmission- Air permeability and measurement.	9
Comfort Properties of Fibers, Yarns and Fabric 9 Comfort properties of fibers: Physical modification of fibers - Comfort properties of yarns: Effect of yarn structure characteristics, effect of spinning technique, texturizing - Comfort properties of fabric structures: Fabric constructional parameters, finishing.	9
Comfort Property of Clothing Physical Properties of Clothing and Comfort: Thermal resistance – Water vapour diffusion resistance – Water holding property – Effect of fabric properties – Radiation exchange – Flammability – Clothing with internal spaces.	9
	Hours:45

Text book(s):

1.	A Das, R.Alagirusamy, “Science in clothing comfort”, Woodhead publishing, India ISBN:978184596789, 2010.
2.	G.song, “Improving comfort in clothing”, woodhead publishing services in textiles : 106, ISBN:184569 539, 2011

Reference(s):

1.	Li.Y, “The Science of Clothing Comfort”, Textile Progress, Vol.31, Textile Institute,2001.
2.	Saville B.P, “Physical Testing of Textiles”, The Textile Institute, Wood head PublishingLimited, Cambridge, 2009.
3.	Buchanan D.R, “The Science of Clothing Comfort”, Textile Progress, Vol.31,No.1/2,1999.
4.	Ukponmwan .J.O., “The Thermal Insulation Properties of Fabrics”, Textile Progress,Vol.24, No.4, 1992.

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60 PTT 2P1	Textile Product Development Lab

Category	L	T	P	Credit
PC	0	0	6	3

Objective

- To enable the student to design, innovate and develop a product that can be commercialized

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the significance of product development in textiles and its overall design logic.
CO2	Explain the market research, product life cycle and bench marking with suitable examples in textiles.
CO3	Apply the knowledge of simulation for the product development.
CO4	Study & Analyze the techno economics of each of the case studies.
CO5	Evaluate the end product usage.

K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT 2P1 – Textile Product Development Lab								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	6	90	3	60	40	100

1. This lab will provide a practical understanding of process involved in textile product development, product characteristics and development of different textile products.

2. This lab also provides hands on experience of using different machineries/ equipments for textile product development.

Hours:90

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60 PTT 2P2	60 PTT 2P2 - TERM PAPER AND SEMINAR

Category	L	T	P	Credit
EEC	0	0	6	0

Objective

- Students will develop their scientific and technical reading and writing skills that they need to understand and construct research articles.
- A term paper requires a student to obtain information from a variety of sources (i.e.,Journals, dictionaries, reference books) and then place it in logically developed ideas.
- To identify the recent topics in the research area and formulate the problem
- To analyze the mathematical model for the identified problem
- To design and simulate/ develop prototype model.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Survey the relevant bibliography such as national/international referred journals for the preferred areas of research
CO2	Develop scientific, technical reading and writing skills for the technical report preparation to apply it in their topics of research
CO3	Apply mathematical ideas to any problem in the research field
CO4	Implement and analyze the various complex problems in different practical applications
CO5	Cultivate presentation skills to deliver their work in front of technically qualified audience

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY – AUTONOMOUS R2022								
60 PTT 2P2 - TERM PAPER AND SEMINAR								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	2	30	0	100	0	100

The work involves the following steps:

1. Selecting a subject, narrowing the subject into a topic.
2. Stating an objective.
3. Collecting the relevant bibliography (at least 15 journal papers)
4. Preparing a working outline.
5. Studying the papers and understanding the authors contributions and critically analysing each paper.
6. Preparing a working outline.
7. Linking the papers and preparing a draft of the paper.
8. Preparing conclusions based on the reading of all the papers.
9. Writing the Final Paper and giving final Presentation

Please keep a file where the work carried out by you is maintained.

[9]

Activities to be carried out

Activity	Instructions	Submission week	Evaluation
Selection of area of interest and Topic Stating an Objective	An area of interest, topic has to be selected and objective to be framed	2nd week	3 % Based on clarity of thought, current relevance and clarity in writing
Collecting Information about chosen area & topic	1.List 1 Special Interest Groups or professional society 2.List 2 journals 3.List 3 conferences, symposia or workshops 4. List 1 thesis title 5. List 5 web presences (mailing lists, forums, News sites) 6. List 6 authors who publish regularly in your area 7. Attach a call for papers (CFP)from your area. 8. Conference/Journal/Symposium in the chosen area.	3rd week	3% (the selected information must be area specific and of international and national standard)
Collection of Journal papers in the topic in the context of the objective – collect 20 & then filter	• Provide a complete list of references you will be using- Based on the objective -Search various digital libraries and Google Scholar • When picking papers to read - tryto: • Pick papers that are related to each other in some ways and/or that are in the same field so that a meaningful survey can be written • Favour papers from well-known journals And conferences, • Favour—first‖or foundational‖papers in the field (as indicated in other people's surveypaper),Favour more recent papers, • Pick a recent survey of the field so you can quickly gain an overview, • Find relationships with respect to each other and to your topic area (classification scheme/categorization) • Mark in the hard copy of papers whether complete work or section/sections of the paper are being considered	4th week	6% (the list of standard papers and reason for selection)
Reading and notes for first 5	Reading Paper Process • For each paper form a Table	5th week	8% (the table given should indicate your

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papers	answering the following questions: • What is the main topic of the article? • What was/were the main issue(s) the author said they want to discuss? • Why did the author claim it was important? • How does the work build on other's work, in the author's opinion? • What simplifying assumptions does the author claim to be making? • What did the author do? • How did the author claim they were going to evaluate their work and compare it to others? • What did the author say were the limitations of their research? • What did the author say were the important directions for future research? Conclude with limitations/issues not addressed by the paper (from the perspective of your survey)		understanding of the paper and the evaluation is based on your conclusions about each paper)
Reading and notes for next5 papers	Repeat Reading Paper Process	6th week	8% (the table given should indicate your understanding of the paper and the evaluation is based on your conclusions about each paper)
Reading and notes for final 5 papers	Repeat Reading Paper Process	7th week	**8%** (the table given should indicate your understanding of the paper and the evaluation is based on your conclusions about each paper)
Draft outline 1 and Linking papers	Prepare a draft Outline, your survey goals, along with a classification / categorization diagram	8th week	**8%** (this component will be evaluated based on the linking and classification among the papers)
Abstract	Prepare a draft abstract and give a presentation	9th week	**6%** (Clarity, purpose and conclusion) **6%** Presentation & Viva Voce
Introduction Background	Write an introduction and background sections	10th week	**5%** (clarity)
Sections of the paper	Write the sections of your paper based on the classification / categorization diagram in keeping with the goals of your survey	11thweek	**10%** (this component will be evaluated based on the linking and classification among the papers)
Conclusions	Write your conclusions and future work	12th week	**5%** (conclusions – clarity and your ideas)
Final Draft	Complete the final draft of your paper	13th week	**10%** (formatting, English, Clarity and linking) **4%** Plagiarism Check Report
Seminar	A brief 15 slides on your paper	14th& 15th week	**10%** (based on presentation and Viva-voce)

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60 PTT 301	Protective Textiles

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To know the functional requirements of protective clothing
- To learn about selection of fibre, yarn and fabric for protective clothing
- To evaluate protective clothing products.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain knowledge on selection of fibres for protective clothing
CO2	Gain knowledge on selection of appropriate fabric structures
CO3	Analysis the clothing construction methods
CO4	Understand different types of finishes given to develop protective clothing
CO5	Analysis and evaluation the different methods of testing protective clothing

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT 301 – Protective Textiles								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Fibre Requirements Suitability and properties of high performance fibres for various protective clothing – chemical composition and physical structure	9
Yarn and Fabric Requirements Types of yarns; woven, knitted and non - woven fabric structures, methods of production, effect of structure on their performance	9
Clothing Construction Method of construction of garments according to various protective end uses like protection against cold, ballistic protection, use of different fabric type (knitted, woven, and Non-woven), coated / laminated in different places; use of inter lining and composites; 3D structures; high tech textiles – variable electronics; protective garments for industrial and apparel end uses	9
Finishing of Protective Clothing Types of finishes - fire retardant finishes, water repellent finishes, anti - microbial finishes; chemical finishes against radiation and chemicals; method of application of finishes; protective finishes for health care garments	9
Quality Evaluation Evaluation of protective fabrics; desirable properties of protective textiles, method of testing for thermal protective performance, abrasion and wear resistance, evaluation of resistance to mildew, ageing, sunlight, chemical, electrostatic and electrical resistivity, impact properties; ASTM standards for protective garments	9
Hours: 45	

Text book(s):

1.	Adanur S., "Wellington sears handbook of Industrial textiles" Technomic publishing co. inc., 1995, ISBN : 1 – 56676 – 340 – 1
2.	Allison Mathews. and Martin Hardingham, "Medical and Hygiene Textile Production – A hand book" Intermediate Technology Publications, 1994.

Reference(s):

1.	Anand S.C., Kennedy J.F., Miraftab.M and Rajendran.S., "Medical textiles and biomaterials for health care", Woodhead Publishing Ltd, Cambridge, UK,2006, ISBN 1- 85573-683-7.
2.	Anand S.C., "Medical Textiles", Textile Institute, Manchester, 2001, ISBN:185573494X.
3.	Chellamani K.P. and Chattopadhyyay D., "Yarns and Technical Textiles", SITRA, 1999.

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60 PTT 3P1	PROJECT WORK – I

Category	L	T	P	Credit
EEC	0	0	12	6

Objective

- To impart practical knowledge to the students and also to make them to carry out the technical procedures in their project work.
- To provide an exposure to the students to refer, read and review the research articles, journals and conference proceedings relevant to their project work and placing this as their beginning stage for their final presentation
- To Independently carry out research / investigation and development work to solve practical problems in the field of Textile
- To write and present a substantial technical report / document in the field of Textile
- To demonstrate the Research findings in Textile domain.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Survey the relevant literature such as books, national/international refereed journals and contact resource persons for the selected topic of research.
CO2	Use different experimental techniques/different software/ computational/analytical tools.
CO3	Design and develop an experimental set up/ equipment/testing.
CO4	Conduct tests on existing setups / equipment's and draws logical conclusions from the results after analyzing them.
CO5	Work in a research environment or in an industrial environment

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60 PTT 3P1 - PROJECT WORK – I								
PTT : M. Tech Textile Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	0	0	12	180	6	40	60	100
Methodology	• The Project Work should preferably be a problem with research potential • The Project should involve scientific research, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution • Seminar should be based on the area in which the candidate has undertaken the dissertation work as per the common instructions for all branches of M.E/M. Tech • Three reviews will be conducted by a committee of subject experts • Each review has to be evaluated for 100 marks • Internal evaluation has to be done for 100 marks • The final examination shall consist of the preparation of report consisting of a detailed problem statement and a literature review • The preliminary results (if available) of the problem may also be discussed in the report • The work has to be presented in front of the examiners panel set by Head and PG Project Coordinator							

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60 PTT 3P2	PROJECT WORK – II

Category	L	T	P	Credit
EEC	0	0	24	12

Objective

- This enables and strengthens the students to carry out the project on their own and to implement their innovative ideas to forefront the risk issues and to retrieve the hazards by adopting suitable assessment methodologies and staring it to global.

Prerequisite

60 PTT 3P1

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the problem /idea and review and summarize the literature for the topic of the identified problem
CO2	Illustrate the suitable design of experiments including experimental plan.
CO3	Explain the concepts of design and development of selected research work.
CO4	Construction, and fabrication of innovative product/system for the project title
CO5	Use various tools of testing and statistical analysis for the data in order to draw relevant conclusions.

K.S.RANGASAMY COLLEGE OF TECHNOLOGY – AUTONOMOUS R2022

60 PTT 4P1 - PROJECT WORK – II

PTT : M. Tech Textile Technology

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	0	0	24	360	12	40	60	100

It is a continuation of Project work started in semester III. Students have to submit the report in prescribed format and also present a seminar. The dissertation should be presented in standard format as provided by the department. The candidate has to prepare a detailed project report consisting of introduction of the problem, problem statement, literature review, objectives of the work, methodology (experimental set up or numerical details as the case may be) of solution and results and discussion. The report must bring out the conclusions of the work and future scope for the study. The work has to be presented in front of the examiners panel consisting of an approved external examiner, an internal examiner and a guide, co-guide etc. as decided by the Head and PG coordinator. The candidate has to be in regular contact with his/her guide.

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60 PTT E11	Alternative Spinning Systems

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To understand theory of yarn formation by rotor spinning,
- To understand friction spinning, air-jet spinning and other spinning systems
- To know effect of process parameters used in the spinning system on yarn quality.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the process parameters for producing rotor spun yarn.
CO2	Understand DREF-2, DREF-3 spinning systems
CO3	Gain knowledge on air vortex spinning technique.
CO4	Understand the concept of new spinning technologies
CO5	Gain knowledge on wrap yarn and their applications.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT E11- Alternative Spinning Systems								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Rotor Spinning Principle of open end spinning; description of the working of the rotor spinning; requirements of the raw materials; preparation of the sliver for rotor spinning; yarn formation and its structure; yarn withdrawal and winding; design of rotor, opening roller, transport tube, navel and their implications on production and yarn quality; developments in rotor spinning machine; production limits; process control; techno economic comparison with ring spinning.	12
Friction Spinning Principle of yarn formation - DREF-2, DREF-3 spinning systems; developments in friction spinning systems; raw material requirement; effect of process variables on yarn quality; application of these machines for different end products; the economics; technological limitations.	9
Air-Jet Spinning Description of the yarn production in air jet spinning machine; feasibility of higher draft applied in this machine; structure and quality of the air-jet spun yarn; raw materials requirement; process variables; production of by Airvortex system.	9
Other Spinning Technologies Production of yarn in PLYfil, self twist, electrostatic, Bobtex spinning systems; working details of the production of double-rove yarns.	9
Wrap Yarns Wrap yarns and core spun yarns; use of raw materials; economics of these methods of yarn production; yarn characteristics and their applications.	6
	Hours: 45

Text book(s):

1.	Lawrence C. A., “Advances in yarn spinning technology” Wood head publishing, 2010, ISBN-13: 978 1 84569 444 9.
2.	Klein W., “Rieter Manual of spinning”, Vol.5&6, Rieter Machine Works, Winterthur, 2014 .

Reference(s):

1.	Oxtoby E., “Spun Yarn Technology”, Butterworths, London, 2001.
2.	Klein W., "New Spinning Methods ", The Textile Institute, Manchester, 2003.
3.	Dyson E., "Rotor Spinning, Technical and Economics Aspects ", Textile Trade Press, New Mills, Stock Port, 2003.
4.	Salhotra K.R. and Ishtiaque S.M., "Rotor Spinning; its advantages ", Limitations and Prospects in India, ATIRA, Ahmedabad, 2000.

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60 PTT E12	Characterization of Textile Polymers

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To enable the students to learn about different characteristics of polymers.
- To understand the production of textile fibres and their evaluation.
- To gain knowledge on molecular structure.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain knowledge on the dynamics of molecular weight
CO2	Understand molecular structure characterization
CO3	Analysis of different thermal properties
CO4	Gain knowledge on optical & electron microscopy
CO5	Understand surface energy measurements

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT E12 - Characterization of Textile Polymers								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Molecular Weight Polymer solution thermo dynamics; molecular weight and molecular dimensions by end group analysis, osmometry, light scattering, viscometry, gel permeation chromatography, high performance liquid chromatography.	9
Molecular Structure Molecular Structure Characterisation using Infrared, NMR, UV–visible, Raman spectroscopy, mass spectroscopy	9
Thermal Properties Thermal properties by differential scanning calorimetry, differential thermal analysis, thermo gravimetry, thermo-mechanical analyzer, dynamic mechanical and dielectric analysis	9
Structural Properties Optical and electron microscopy; TEM, SEM, AFM, X-ray scattering from polymers, briefregence, crystallinity by density measurements,	9
Surface Properties Surface area, pore volume measurements by B.E.T. method, porosimetry, surface energy measurements and particle size measurement.	9
	Hours: 45

Text book(s):

1.	Stamm M., “Polymer surfaces and Interfaces”, Springer 1st edition, 2008.
2.	Sperling, “Introduction to Physical Polymer Science,” Wiley Publication, 2015.

Reference(s):

1.	Campell D. and White J.R, “Polymer characterization, Physical Techniques”, McGraw – Hill, New York. 2000.
2.	Bill mayer, “Textbooks of Polymer Science,” 3rd edition., Wiley Publication, 2004.
3.	Gupta V.B. and Kothari V.K., “Man Made Fibre production,” Chapman and Hall, 2001.

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60 PTT E13	Medical Textiles

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To understand different types of biomaterials
- To gain knowledge biomedical application of textile structures.
- To understand implantable products.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain knowledge on materials available for biomedical applications
CO2	Explain application of health care and its by-products
CO3	Select bandages for various end uses.
CO4	Understand the different types of wound dressings
CO5	Understand the practical uses of implantable products

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT E13 - Medical Textiles								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Biomaterials Biomaterials–introduction, Classifications and behaviour of Different Types of Biomaterials ; natural, polymeric and biological biomaterials	5
Healthcare and Hygiene Products Textile based healthcare and hygiene products; application of nano technology in medical hygiene textiles; advanced textile materials in healthcare; infection control and barrier materials; plasma treated barrier materials.	10
Bandages Bandages and pressure garments - elastic and non elastic compression bandages, support and retention bandages; bandaging textiles; evaluation of bandages; bandages for various end uses.	10
Wound Dressing Wound – types, healing process; requirements of wound dressing; wound care materials – types, advantages and limitations; Testing of wound dressings; advanced wound dressings	10
Implantable Products Implantable products; sutures – requirements, classifications, specifications, materials and their applications; vascular grafts, artificial ligaments, artificial tendons; scaffolds for tissue engineering; intelligent textiles for medical applications	10
	Hours: 45

Text book(s):

1.	Allison Mathews and Martin Hardingham ., “Medical and Hygiene Textile Production – A hand book”, Intermediate Technology Publications, 2004.
2.	Anand S.C., Kennedy J.F. Miraftab M. and Rajendran S., “Medical Textiles and Biomaterials for Health care”, Wood head Publishing Ltd. 2006.

Reference(s):

1.	Joon B. Park. and Joseph D. Bronzino., “Biomaterials – Principles and Applications”, CRC Press Boca Raton London, NewYork, Washington , D.C. 2002
2.	Anand S., “ Medical Textiles”, Textile Institute, 2000, ISBN: 185573317X
3.	Horrocks A.R. and Anand S.C, “Technical Textiles”, Textile Institute,2005, ISBN: 85573317X.
4.	Adanur S., “ Wellington Sears Handbook of Industrial Textiles”’ Technomic Publishing Co., Inc., Lancaster Pennylvania 2005, ISBN 1-56676-340-1.

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60 PTT E21	Theory of Drafting and Twisting

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To enable the students to learn about the structure of ideal and real yarn,
- To enable the students to learn about migration of fibres in the yarn, breakage mechanism of yarn, mechanics of blended yarns
- To enable the students to learn about relationship between structure and property of yarns produced by different spinning systems..

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the Elements of yarn geometry
CO2	Gain knowledge on fibre migration for filament and spun yarns
CO3	Understand the analysis of tensile behaviour of filament and spun yarns
CO4	Gain knowledge on mechanism of blended yarn
CO5	Understand structure properties relationship for various spinning systems

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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60 PTT E21 - Theory of Drafting and Twisting								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total	Credit	Maximum Marks		
	L	T	P	hrs	C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Yarn Geometry Elements of yarn geometry; geometry of helix and its application to yarn structures; yarn diameter, packing of fibres in yarn; estimation of packing density and radial packing density of yarn; geometry of folded yarns	9
Fibre Migration Migration characteristics in continuous filament and spun yarns; effect of various parameters on migration; measurement of fibre migration in yarn; effect of migration on tensile behaviours and hairiness of the yarn	9
Yarn Mechanics Analysis of tensile behaviour, prediction of breakage - continuous filament yarn and spun yarn; effect of fibre properties and geometrical configuration of yarn on the tensile and bending properties of yarn; design of yarn structures for certain functional uses	9
Blended Yarn Mechanics Blend irregularity; measurement of blending irregularity; concept of elongation balance; effect of properties of constituent fibres and blend composition on behaviour of blended yarns	9
Structure - Properties Relationship Structure - property relationship in yarns produced from ring spinning, rotor spinning, friction spinning, airjet spinning and other new spinning systems.	9
	Hours: 45

Text book(s):

1.	Hearle J.W.S., Grosberg P. and Baker S., “Structural Mechanics of fibres, yarns and fabrics”, Wiley Interscience, 2008 New York.
2.	Goswami B.C., Martindale J.G. and Scardino F.L., “Textile Yarns: Technology, Structure and Applications”, Wiley Interscience, 2010 New York,.

Reference(s):

1.	Hearle J.W.S., Thwaitesand J.J. and Amikrbayhat A., “Mechanics of Flexible Fibre Assemblies”, Maryland, 1998
2.	Postle P., Dejong S.and Carnaby G.A., “The Mechanics of Wool Structure”, Ellis Horwood, London, 1999.
3.	Grosberg P. and Iype C., “Yarn production: Theoretical aspects”, Textile Institute publication, 1999, ISBN-13: 978 1 87037 203 9.

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60 PTT E22	High performance and specialty fibres

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To understand advanced spinning technology
- To gain knowledge on manufacturing high performance fibres
- To impart knowledge on the properties and applications of high performance fibre.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the method of producing high performance fibres
CO2	Gain knowledge on the industrial applications of various fibers
CO3	Understand properties and applications of fibers for medical field
CO4	Gain knowledge on speciality fibres and its applications
CO5	Understand the properties of chemical and thermal resistant fibers

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

Passed in BoS Meeting held on 11/05/2023
Approved in Academic Council Meeting held on 03/06/2023

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT E22 - High performance and specialty fibres								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total	Credit	Maximum Marks		
	L	T	P	hrs	C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Objective(s)	• To understand advanced spinning technology • To gain knowledge on manufacturing high performance fibres • To impart knowledge on the properties and applications of high performance fibre
Course Outcomes	**At the end of the course, students will be able to** 1. Understand the method of producing high performance fibres 2. Gain knowledge on the industrial applications of various fibers 3. Understand properties and applications of fibers for medical field 4. Gain knowledge on speciality fibres and its applications 5. Understand the properties of chemical and thermal resistant fibers

Advanced Spinning Technology Advances in conventional fibre forming process; gel spinning; liquid crystal spinning; electro-spinning, nano spinning.	9
High Performance Fibres for Industrial Applications Manufacturing, properties and applications of glass fibres, basalt fibres; carbon fibres, high performance polyethylene fibres; ceramic fibres	9
High Performance Fibres for Medical Applications Manufacturing, properties and applications of alginate fibres; chitosan fibres; regenerated silk and wool protein fibres; synthetic biodegradable fibres	9
Speciality Fibres Hollow and profile fibres; blended and bi-component fibres; film fibres and functionalized fibres for specific applications.	9
Resistant Fibres Manufacturing, properties and applications of chemical and thermal resistant fibres.	9
	Hours: 45

Text book(s):

1.	Hearle J. W. S., “High Performance Fibres”, Woodhead Publishing Ltd., Cambridge, England, 2009.
2.	Hongu T. and Phillips G.O., “New Fibres”, Woodhead Publishing Ltd., England, 2010.

Reference(s):

1.	Kothari V. K., “Textile Fibres: Development and Innovations”, Vol. 2, Progress in Textiles, IAFL Publications, 2000.
2.	Peebles L.H., “Carbon Fibres”, CRC Press, London, 2005.

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60 PTT E23	Nano Technology in Textiles

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To understand the concepts of nanotechnology.
- To know the applications of nanotechnology in textiles.
- To gain knowledge on the characterization of nano textiles.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain knowledge on nano fibre and nano particles
CO2	Understand the applications of nano fibres
CO3	Impart knowledge on various nano finishing
CO4	Understand characterization of nano textiles
CO5	Gain knowledge on various types of nano composites and nano coating technologies

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT E23 - Nano Technology in Textiles								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Introduction Nano Technology: definition and basic concepts, particle size, nano particles; Different types of process: Top down approach, bottom up approach; Synthesis of nano materials used in textiles.	9
Nano Fibres and Nano Particles Nano fibres: Definition, properties and applications such as filtration, tissue engineering; Electro spinning of nano fibres: capillary method, charge injection method; Production of non-continuous or short yarns: Rotating collector method, Gap alignment method; carbon nano fibres, metal and metal oxide nano particles such as nano silver, nano silica, nano titanium, nano zinc oxide, nano magnesium oxide.	9
Applications and Nano Finishing Applications of nano technology in textile materials and polymers; Nano finishing through water and oil repellent, self cleaning, anti microbial, UV protective, nano architecture, nanopel, nano care, nano touch, nano feel, lotus effect.	9
Characterization of Nano Textiles Characterization methods: Optical microscopy, Scanning Electron Microscopy, Transmission electron microscopy, Atomic force microscopy, Energy dispersion X-ray and raman spectroscopy. Testing of nano functional Textiles: Anti-microbial testing, UV protection testing and self cleaning testing.	9
NT, Nano composites and Nano Coating Synthesis of carbon nano tubes: principle methods, arc discharge, laser ablation, chemical vapour deposition (CVD); Polymeric Nano Composites: definition, types, characterization, applications; Nanotechnologies for coating and structuring of textiles: Anti-adhesive nano coating of fibres and textiles, water and oil repellent coatings by plasma treatment, self cleaning super hydrophobic surfaces, layer by layer self assembly, sol-gel coating.	9
Hours: 45	

Text book(s):

1.	Ashutosh Sharma, Jayesh Bellare and Archana Sharma, “Advances in Nano sciences and Nanotechnology”, NISCAIR, First Edition, 2004.
2.	Brown P and Stevens K., “Nano fibres and Nanotechnology in Textiles”, Woodhead Publishing Limited, 2007.

Reference(s):

1.	Jurgen Schulte, “Nanotechnology: Global strategies, industry trends and applications”, Wiley Publications, 2005.
2.	Bhushan Bharat, “Springer Handbook of Nanotechnology”, Springer, 2007.
3.	Brown P and Stevens K, “Nano fibres and Nanotechnology in Textiles”, Woodhead Publishing Limited, 2007.
4.	Industry insight Indian nanotechnology”, Cygnus Business Consulting and Research, 2006.

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60 PTT E 31	Process Control and Optimization in Yarn Spinning

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- The process control at different stages of spinning preparatory.
- To understand Ring spinning process to achieve yarn of required quality
- To analyze the influence on yarn quality, process changes for processing of manmade fibres
- To know the control of comber preparatory process; noil%, combing efficiency and neps removal efficiency of comber.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the process variables and their control in blowroom process
CO2	Optimize, assess and control card sliver quality
CO3	Gain knowledge draw frame and combing process
CO4	Understand the quality assessment and control in roving and ring spinning
CO5	Gain knowledge on the limitation of spinning machinery and new concepts for higher production

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTTE 31 - Process Control and Optimization in Yarn Spinning								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total	Credit	Maximum Marks		
	L	T	P	hrs	C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Blowroom Process Opening and cleaning efficiency-assessment and control; optimization of trash removal, control of lint in waste; causes for neps generation, control; role of blowroom accessories; assessment and control of blowroom output quality, its influence on yarn quality; process changes for processing manmade fibres	9
Carding Process Optimization of trash removal – its influence on quality, control of lint in waste; neps removal efficiency, cleaning efficiency – factors, control; hooks formation; levelling – optimization; assessment and control of card sliver quality, it influence on yarn quality; process changes for processing manmade fibres	9
Drawframe Process and Combing Process Levelling in drawframe-optimization; blended yarn production- blending irregularity assessment and control; hooks straightening in roller drafting arrangement; quality of drawframe sliver-assessment and control, its influence on yarn quality; quality of comber lap - control of comber preparatory process; noil%, combing efficiency and neps removal efficiency of comber – assessment and control; hooks removal	9
Roving and Yarn Production Processes Roving quality-assessment and control, its influence on yarn quality; ring spinning- control of end breakage rate; quality of yarn-assessment and control; changes for processing manmade fibres; classification of yarn defect, control of yarn defects	9
Production Control Factors affecting the production limits of the spinning machinery; new concepts in achieving higher production in the spinning machinery; role of humidity and machinery maintenance- production and quality; computation of the labour and machine productivity indices	9
	Hours: 45

Text book(s):

1. Furter R., “Evenness Testing in Yarn Production Part 1 and Part II “, The Textile Institute, Manchester, 2002.
2. Garde A.R. and Subramaniam T.A., “Process Control in Spinning”, ATIRA Publications, Ahmedabad, 2004.

Reference(s):

1. Klein W., “Rieter Manual of spinning”, Rieter Machine Works, Winterthur, 2014
2. Lord P.R., “Yarn Production; Science, Technology and Economics”, The Textile Institute, Manchester, 2000.
3. Slater K., “Yarn Evenness”, Textile Progress, The Textile Institute, Manchester, 2001
4. Townend P.P., “Nep Formation in Carding “, Wira, U.K., 2002.

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60 PTT E 32	Enzyme Technology for Textile Processing

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To know enzymes, types and kinetics of enzyme reaction on textile fibres
- To understand application of enzymes on different fibres and
- To analyze the treatment of enzyme effluents.
- To know the specificity of enzyme action; extraction and purifications of enzymes.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Undersatnd the rationale for selecting enzymes for particular process and
CO2	Explain the kinetics of single and multi substrate enzymes
CO3	Understand enzymes in pretreatment of cotton substrates
CO4	Gain knowledge on enzymatic modification of man made fibers.
CO5	Analyze Enzyme technology for effluent treatment.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTTE 32 - Enzyme Technology for Textile Processing								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Enzymes Nomenclature and classification of enzymes; characteristic features of enzymes; modifiers of enzyme activity - activators and inhibitors; specificity of enzyme action; extraction and purifications of enzymes	9
.**Enzyme Kinetics** Kinetics of single-substrate enzyme-catalysed reactions; Basics of kinetics of multi-substrate enzyme-catalysed reactions.	9
Enzymes for Cotton Fibre Chemistry and structure of cotton fibre; enzymes in pretreatment of cotton substrates –desizing, scouring, bleaching and bio finishes.	9
Enzymes for Other Fibers Enzymes for processing and functionalizing protein fibres; enzymatic modification of polyester, polyamide, polyacrylonitrile and cellulose acetate fibres.	9
Enzymes in Effluent Treatment Enzyme technology and biological remediation, Enzyme decolourisation and decolouration by biosorption and enrichment cultures.	9
	Hours: 45

Text book(s):

1.	Cavaco-Paulo A and Gubitz G., "Textile processing with enzymes", Wood head Publishing Ltd, Cambridge, UK, 2003.
2.	Freifelder D., "Molecular Biology ", Jones and Bartlett Publishers Inc. 2000.

Reference(s):

1.	Nierstrasz V. and Cavaco-Paulo A., "Advances in textile biotechnology", Woodhead Publishing, Ltd Cambridge, UK, 2010.
2.	Wei. Q., 'Surface modification of Textiles', Woodhead Publishing Ltd., 2009.
3.	Michael A. Lieberman, Allan J. Lichtenberg, 'Principles of Plasma Discharges and Materials Processing', John Wiley & Sons,2001.
4.	Roshan Shishoo, 'Plasma Technologies for Textiles', Woodhead Publishing,2007.

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60 PTT E 33	Financial Management in Textile Industry

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To understand the basic concepts of financial accounting and capital budgeting.
- To practice the fundamental concepts of costing and costing systems followed in apparel industry.
- To know about the costing of textile products
- To gain knowledge on different sources of finance, cost of capital and investment appraisal techniques and financial statements.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concepts of Financial Management and capital budgeting.
CO2	Understand importance of principles and concepts of working capital, operating cycle, determinants of working capital.
CO3	Gain knowledge on the basic concepts of cost accounting
CO4	Understand basic concepts of different costing systems.
CO5	Calculate the CMT costing technique for garment production

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R2022
60 PTTE 33 - Financial Management in Textile Industry								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Introduction and Capital Budgeting Objectives, scope and functions of financial management - Profit maximization wealth maximization - Functions of financial manager Capital Budgeting: Nature and principles -Techniques of investment analysis – payback period method, accounting rate of return(ARR), Discounted cash flow methods – IRR and NPV.	9
Working Capital and Inventory Management Definition – Types of working capital – Gross and Net working capital – Operating cycle – Factors influencing working capital - Inventory control techniques - Economic order quantity, ABC analysis.	9
Cost Accounting Cost accounting, compare cost accounting and financial accounting, elements of cost, examples from apparel industry, methods of costing, cost sheet preparation - simple problems.	9
Costing Systems Job order costing; contract costing; process costing: joint and by product costing in apparel manufacturing.	9
CMT Cost Costing of garments; factors that determine the price of garments – material cost, cost of yarn, cost of fabric production, cost of fabric processing and design, lot size, cost of components, cutting cost, making and trim cost, simple problems.	9
	Hours: 45

Text book(s):

1.	Asish K. Bhattacharyya., Principals and practice of cost Accounting, PHI. Third Edition, 2010
2.	S.P. Iyengar., Cost Accounting – Principles and practice. Sultan chand & Sons, New Delhi, 2005

Reference(s):

1.	Pandey I. M., "Financial Management", Vikas Publishing House Pvt. Ltd., New Delhi, 8th Edition, 2000.
2.	Prasanna Chandra, "Financial Management, Theory and Practice, Tata McGraw-Hill Publishing Company Ltd, 5th Edition, New Delhi, 2001.
3.	Khan and Jain, "Basic financial Management & Practice", Tata McGraw Hill, New Delhi, 5th, Edition, 2001.
4.	Aswat Damodaran, "Corporate finance theory and practice", John Wiley and Sons, Asia.,2000.

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60 PTT E 41	Design Concepts in High Speed Fabric Formation

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To enable the students to study about developments in
- To analyze the Preparatory processes, 3D fabric formation and machineries of technical fabric production.
- To know the developments in the design of winding, warping and sizing machines for improving quality of preparation.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain knowledge on the preparatory processes and developments on technical fabricproduction.
CO2	Understand the weft Insertion in shuttleless looms – rapier, projectile movement, jet profile in air jet loom.
CO3	Understand the developments in 3D fabric formation and principle involved.
CO4	Analyze the developments in narrow width fabric mmanufacturing
CO5	Understand the developments in weft knitting and warp knitting machines for producing technical fabrics.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTTE 41 - Design Concepts in High Speed Fabric Formation								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Winding and Warping Developments in the design of winding, warping and sizing machines for improving quality of preparation and productivity of preparatory processes.	9
Weft Insertion Techniques Theoretical analysis of weft Insertion in shuttleless looms – rapier, projectile movement, jet profile in air jet loom; developments in the design of pick insertion systems, shed forming mechanisms, developments in other auxiliary mechanisms	9
3D fabric formation Developments in 3D fabric formation, different principles involved in 3D fabric formation	9
Narrow width fabric Developments in narrow width fabric, carpets and braids manufacturing	9
Weft knitting and warp knitting Techniques Developments in weft knitting and warp knitting machines for technical fabrics	9
Hours: 45	

Text book(s):

1.	3D Fibrous Assemblies, Jinlian HU, Woodhead Publishing, Cambridge, 2008, ISBN: 978-1-84569377-0.
2.	A. Ormerod, “Modern Preparation and Weaving Machinery”, Buttersworth & Co., UK,1983

Reference(s):

1.	Advances in Carpet Manufacture, K.K. Goswami, Woodhead Publishing, ISBN: 978-1-84569-353-6
2.	Advances in Modern Woven Fabric Technology by SavvasVassiliadis, In Tech, Croatia, 2011, ISBN 978-953-307-337-8.
3.	Braiding Technology for Textiles, Y.Kyosev, Woodhead Publishing, 2015, ISBN: 978-0-85709-1352.
4.	D.J. Spencer, “Knitting Technology”, 2nd Edn.Pergamon Press, 1989.

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60 PTT E 42	Management of Textile Effluents

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To know Pollutants from textile chemical processing industry, treatment and Government regulations.
- To know the functions and activities of Ministry of environment; Central and State pollution control boards
- To analyze the Waste water characteristics; wastewater treatment - objectives, methods and implementation considerations.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain knowledge on the hazards due to pollutants from textile chemical processing industry
CO2	Gain knowledge on the method of waste water treatments
CO3	Managing pollutants as per Government regulations and Methods of green processing.
CO4	Understand the technical regulation in safety and health of textile materials
CO5	Understand the need for solid and hazardous waste management in textile industry

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTTE 42 - Management of Textile Effluents								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Industrial policies and Environmental guidelines for industries Industrial policy of India; pollution monitoring and control; functions and activities of Ministry of environment; Central and State pollution control boards; environmental clearance and guidelines for industries; environment impact assessment; fiscal incentives for environmental protection; environmental auditing.	9
Waste water management Waste water characteristics; wastewater treatment - objectives, methods and implementation considerations; recycling of effluents.	9
Pollution control in Textile industries Identification and reduction of pollution sources in textile wet processing; pollution control in man - made fibre industry; analysis of textile processing effluents – colour, odour, pH, total solids, suspended solids, total dissolved solids, BOD, COD, total alkalinity, chloride, sulphates, calcium and chromium; tolerance limits for effluents; bio - degradability of textile chemicals and auxiliaries.	9
Safety and health aspects of textile materials Technical regulations on safety and health aspects of textile materials – banned dyes and chemicals; eco labeling, eco friendly textile processes - machines and specialty chemicals; natural dyes and environmental considerations.	9
Waste Management In Textile Industry Need for solid and hazardous waste management in textile industry, types and sources of solid and hazardous wastes, storage, collection and transport of wastes, waste processing technologies, waste disposal.	9
	Hours: 45

Text book(s):

1. Chritie R., “Environmental aspects of textile dyeing”, Woodhead Publishing Ltd, 2007.
2. Cooper P., “ Colour in Dyehouse Effluent”, Woodhead Publishing Ltd, 2005.

Reference(s):

1. Eco-Textiles: Regulations, Labels, Processing and Testing, A Special Report”, The Bombay Textile Research Association, Mumbai, 2006.
2. George Thobanoglous and Franklin L. Burton., “Waste Water Engineering and Treatment, Disposal, Reuse (Metcalf & Eddy Inc., California)”, Tata McGraw-Hill Publishing co Ltd, New Delhi,
3. Manivasakam N., “Treatment of Textile Processing Effluents (including analysis)”, Sakhi Publications,
4. Skelly J. K., “Water Recycling in Textile wet Processing”, Woodhead Publishing Ltd, 2003.

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60 PTT E 43	Textile Reinforced Composites

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To understand reinforcements, matrices used for the composites
- To know the manufacture and testing of composites and
- To analyze the Mechanics of failure of composites
- To understand the fibre volume and weight fraction, specific gravity of composites.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the different types of textile reinforcements
CO2	Select matrices for the manufacture of composites for getting different characteristics
CO3	Know the composites manufacturing for both thermoplastics and thermosets - Hand layup, filament winding
CO4	Evaluate the testing of composites
CO5	Understand the micro mechanics and macro mechanics of laminates.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous							R 2022
60 PTTE 43 - Textile Reinforced Composites							
PTT : M. Tech Textile Technology							
Elective	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Reinforcements Manufacturing, properties and applications of Glass, Quartz, Boron, Silicon carbide, Carbon, HPPE and Aramid fibers.	9
Matrices Preparation, Chemistry, Properties and applications of thermoplastic and thermoset resins- Unsaturated Polyester, Vinyl Ester, Epoxy, Phenolics, polyimides, polyurethanes, polyamides, Polypropylene, PEEK and Polycorbanate	9
Composite Manufacturing Composites manufacturing for both thermoplastics and thermosets- Hand layup, Filament Winding, Resin transfer moulding, prepregs and autoclave moulding, pultrusion, vaccum impregnation methods, compression moulding; post processing of composites and Composite design requirements	9
Testing Fibre volume and weight fraction, specific gravity of composites, tensile, flexural, impact, compression, interlaminar shear stress and fatigue properties of thermoset and thermoplastic composites.	9
Mechanics Micro mechanics, macro mechanics of single layer, macro mechanics of laminate, classical lamination theory, failure theories and prediction of interlaminar stresses using software	9
Hours: 45	

Text book(s):

1.	Bor Z.Jang, “Advanced Polymer composites”, ASM International, USA, 2002.
2.	Carlsson L.A. and Pipes R.B., “Experimental Characterization of advanced compositeMaterials”, Second Edition, CRC Press, New Jersey, 2004.

Reference(s):

1.	George Lubin and Stanley T.Peters, “Handbook of Composites”, Springer Publications, 2001.
2.	Mel. M. Schwartz, “Composite Materials”, Vol. 1 & 2, Prentice - Hall PTR, NewJersey,2007
3.	Richard M. Christensen, “Mechanics of composite materials”, Dover Publications, 2005.
4.	Sanjay K Mazumdar, “Composites Manufacturing: Materials, Product and Process Engineering”, CRC Press, 2001.

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60 PTT E 51	Control systems and Automation in Textile Engineering

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To gain knowledge on automation and control systems in spinning. ,
- To gain knowledge on automation and control systems in weaving.
- To gain knowledge on automation and control systems in processing.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain knowledge on the applications of instrumentation for control systems
CO2	Understand the concept of electrical, electronics and mechanical automation
CO3	Gain knowledge on automations in Spinning machineries
CO4	Understand the control system and automations in weaving machines
CO5	Demonstrate the computerized processing in textile manufacturing

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

Passed in BoS Meeting held on 11/05/2023
Approved in Academic Council Meeting held on 03/06/2023

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTTE 51 – Control systems and Automation in Textile Engineering								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction About Control System Instrumentation and Transducers: Functional Description of Instruments; Types and applications of Instrumentation - generalized configuration - Tribo electric pick-up, Infrared Transducers - Torque Measurement Elastic transducers - sound level meter - vibration measurements. Control System Components: Basics of control system – Control system examples - Stepper motors - Hydraulic valves - Pneumatic switches, proximity switches and flapper valves - Hydraulic and Pneumatic automation in textile machines- simple sequential logic circuit design - Programmable Logic Controllers (PLC), Block diagram – programming methods – programs – applications of PLC in textile machinery.	9
Industrial automation Industrial Automation: Introduction, integration, material handling system, simple systems for motions by electrical and mechanical devices- Mechanical design for automatic feeding assembly and transfer lines. Electronic Textile Instruments: Electronic principles in evenness tester, classification of faults, digital fibrograph, hairiness meter, Vibroscope - thickness measuring instruments, HVI, AFIS, Universal tensile testers.	9
Control System & Automation In Spinning Industry Control System and Automation in Spinning Machinery: Machinery material flow and its variation controls – Feeders and Stop motions – Auto levelers – safety switches. Production and quality monitors – Full doff and pre-set length monitors. Data acquisition system for spinning preparatory, ring spinning and rotor spinning. On-line monitoring system, case studies.	9
Control System & Automation In Weaving Industry Control System and Automation in Weaving Machinery: Yarn clearer controls - knotter /splicer carriage controls - pre-set length/full cone monitors. Warping machine monitors and controls - sizing machine monitors and controls - auto-reaching/drawing-in and knotting machine monitors and controls. Data acquisition system in weaving preparatory and weaving – humidification system.	9
Computerised Processing In Textiles Computerised Processing: CAD/CAM/CIM in spinning, Weaving, Dyeing, Printing and Apparel production. Electronic Data Interchange and E-com, internet commerce, Business strategy in E-com, Application of E-com in textile industry – Robotics in textile industries.	9
	Hours: 45

Text book(s):

1.	Berkstresser G A, Buchanan D R and Grady P, “Automation in the Textile Industry from Fibres to Apparel”, The Textile Institute, UK, 1995.
2.	George stylios, “Textile objective measurement and automation in garment manufacture”, E.Horwood, 1991.

Reference(s):

1.	Nalura B C, “Theory and Applications of Automatic Controls”, New Age International (P) Ltd Pub, 1998.
2.	Ormerod A, “Modern Development in Spinning and Weaving Machinery”, Butterworths, 1993. Gordon A. Berkstresser III et.al, “Automation and Robotics in the Textile and Apparel Industries”, Noyers Publication Park Ridge, 1996.
3.	Textiles Go On-line”, The Textile Institute, UK, 1996.
4.	Vassiliadis S G, “Automation and the Textile Industry”, Eurotex, 1996.

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60 PTT E 52	Design and analysis of Textile Experiments

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To know the fundamentals of experimental design
- To select the suitable design
- To analyse the results.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the fundamentals of experimental design
CO2	Gain Knowledge on the single factor textile experiments
CO3	Gain knowledge on multifactor textile experiments
CO4	Analyse the special experimental designs for textile applications
CO5	Evaluate by Taguchi methods techniques for textile engineering

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTTE 52 – Design and analysis of Textile Experiments								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100
Objective(s)	• To know the fundamentals of experimental design • To select the suitable design • To analyse the results							
Course Outcomes	**At the end of the course, the student will be able to** 1. Understand the fundamentals of experimental design 2. Gain Knowledge on the single factor textile experiments 3. Gain knowledge on multifactor textile experiments 4. Analyse the special experimental designs for textile applications 5. Evaluate by Taguchi methods techniques for textile engineering							

Experimental Design Fundamentals Importance of experiments, experimental strategies, basic principles of design, terminology, ANOVA, steps in experimentation, sample size, normal probability plot, linear regression model.	9
Single Factor Experiments Completely randomized design, Randomized block design, Latin square design. Statistical analysis, estimation of model parameters, model adequacy checking, pair wise comparison tests, in respect of textile process, machine and quality parameters.	9
Multifactor Experiments Two and three factor full factorial experiments, 2K factorial Experiments, Confounding and Blocking designs; application in textile experiments.	9
Special Experimental Designs Fractional factorial design, nested designs, Split plot design, Introduction to Response Surface Methodology, Experiments with random factors, rules for expected mean squares, approximate- F - tests for textile applications.	9
Taguchi Methods Steps in experimentation, design using Orthogonal Arrays, data analysis, Robust design- control and noise factors, S/N ratios, parameter design, case studies related to textile engineering.	9
Hours: 45	

Text book(s):

1.	Leaf G.A.V., "Practical Statistics for the Textile Industry, Part I and II", The Textile Institute, Manchester, 1984, ISBN:0900739517.
2.	Montgomery, D.C., Design and Analysis of experiments, John Wiley and Sons, 2003.

Reference(s):

1.	Nicolo Belavendram, Quality by Design; Taguchi techniques for industrial experimentation,
2.	Phillip J.Rose, Taguchi techniques for quality engineering, McGraw Hill, 1996.

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60 PTT E 53	Advances in Textile Printing

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To gain knowledge on digital printing, digital image
- To impart knowledge on colour management
- To know about quality evaluation and special printing techniques.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concept of ink jet printing
CO2	Gain knowledge on digital image design
CO3	Know the factors involved in pre treatment of substrates
CO4	Analyse the quality of textile substrates
CO5	Understand the process involved in special printing techniques

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTTE 53 – Advances in Textile Printing								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Ink Jet Printing Ink jet printing-evolution of digital printing, Comparison with conventional printing techniques, theoretical foundations for inkjet technologies- Continuous and drop on demand technologies	9
Digital Image Design Digital image design, editing and data storage systems, Pixel and image formation in digital printers, Digital colour management- Colour gamut and rendering intent, Colour communication.	9
Pretreatment of Substrates Pretreatment of substrates for inkjet printing; Ink jet heads; Inks used for printing- dye fibre interaction, surface energy of inks, dye ink formulation; fixation procedures for inks on substrates; washing of ink jet prints; heat and sublimation printing.	9
Quality Evaluation Quality evaluation of textile substrates used for ink jet printing and inks used for inkjet printing, advantages and limitation in inkjet printing, techno economics of ink jet printing.	9
Special Printing Techniques Special printing techniques- Developments in Photo printing, Blast printing with Indigo, Developments in Xerox printing and Laser printing for fancy effects; Yarn printing; printing of carpets, velvets and knits; Ecofriendly alternatives for auxillaries used in conventional printing.	9
	Hours: 45

Text book(s):

1.	Miles L W C, “Textile Printing”, Society of Dyers and Colourists, Hobbs The Printers, Hampshire, UK, 2003.
2.	Shenai V A, “Technology of Printing”, Sevak Publishers, Mumbai, 1990.

Reference(s):

1.	Shore J, “Colorants & Auxiliaries”, Vol. I & II, Society of Dyers and Colourists, UK, 1990.
2.	Tyler D, “Textile Digital Printing Technologies”, Textile Institute Publication UK, Vol.37 No.4, 2005
3.	Ujiie, “Digital Printing of Textiles”, CRC, Wood Head Publishing Ltd, UK, 2006.

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60 PTT E 61	Filtration Textiles

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To enable the students to learn about the principles of filtration and textile materials used for filtration process.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Principles of filtration
CO2	Fabric construction and finishing treatments of filtration textiles
CO3	Concepts of liquid and oil filtration
CO4	Concepts of solid liquid separation
CO5	Types of Gas filters

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT E 61- FILTRATION TEXTILES								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

BASIC PRINCIPLES Filtration and separation, contaminants, surface and depth filtration; filter ratings and filter test, dust collection – theory and principles, practical implications, cleaning mechanisms; fabric design and selection considerations; filter media: introduction, absorbent, adsorbent and biological filter media, paper and fabrics, woven wire and screens, constructed filter cartridges, membranes, packed beds; types of filters.	9
TEXTILE FILTERS & FINISHING TREATMENTS Fabric construction -woven fabrics, needle felts, knitted fabrics; heat setting, singeing, raising, calendaring, chemical treatments, special surface treatments	9
LIQUID AND OIL FILTRATION Water filters, waste water treatments, surface treatment chemicals; oil and hydraulic systems; engine filters, oil-water separators, oil cleaning and hydraulic systems, oil cleaning, hydraulic systems	9
TEXTILE FILTER IN SOLID-LIQUID SEPARATION Introduction, fabric design/selection consideration, filtration equipment, considerations; yarn types and fabric constructions - monofilaments, multi filaments, fibrillated tape (split film) yarns, staplefibre yarns, yarn combinations; fabric constructions and properties - plain weave, twill weaves, satin weaves, duplex and semi duplex weaves, link fabrics, needle felts	9
GAS FILTRATION Introduction, indoor air quality, fume and vapour emissions, dust collectors, machine air intake filters, vehicle cabin filters, compressed air filtration, pneumatic systems, sterile air and gas filters, respiratory air filters, Engine filters.	9
Hours: 45	

Text book(s):

1.	Alagirusamy R and Das A, “Technical Textile Yarns”, Wood head Publishers, Cambridge, England, 2010
2.	Horrocks A R and Anand S C, “Handbook of Technical Textiles”, Wood head publication and Textile Institute, England, 2000.

Reference(s):

4.	Ken Sutherland, “Filters and Filtration Handbook”, Butterworth-Heinemann Elsevier, Burlington, 2008.
5.	Senthil kumar, “ Textiles in Filtration”, Create space Independent Publications.,2014

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60 PTT E 62	Project Planning and Management

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To understand the basics of project management
- To gain knowledge on planning and budgeting process
- To know about conflict management techniques.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the project formulation and responsibilities of project manager
CO2	Understand the methods of planning and budgeting process
CO3	Gain knowledge on scheduling and resource allocation
CO4	Understand the designing of control system
CO5	Impart knowledge on project organization and Conflict management

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTT E 62 – Project Planning and Management								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction To Project Management Project Management –Definition, Goal; Lifecycles; project selection methods; project formulation; project manager – roles, responsibilities and selection; project teams	9
Planning and Budgeting Planning process – work break down structure, role of multidisciplinary teams; budgeting the project – Methods; cost estimating and improvement; budget uncertainty and risk management	9
Scheduling & Resource Allocation PERT & CPM Networks, crashing; project uncertainty and risk management; simulation, Gantt charts, expediting a project – resource loading and leveling;allocating scarce resources, Goldratt's Critical Chain	9
Control and Completion Plan-Monitor-Control cycle; data collecting and reporting; project control; designing the control system; project evaluation, auditing and termination	9
Project Organisation & Conflict Management Formal organisation structure; Organisation design, types of project organizations; conflict – origin &consequences; managing conflict, team methods for resolving conflict.	9
Hours: 45	

Text book(s):

1.	Clifford Gray and Erik Larson, Project Management, Tata McGraw Hill Edition,2010
2.	Gido and Clements, Successful Project Management, 5thEdition, Thomson Learning, 2011

Reference(s):

1.	Harvey Maylor, Project Management, 4thEdition, Pearson Education, 2010.
2.	John M. Nicholas, Project Management for Business and Technology - Principles and Practice, 4thEdition, Pearson Education, 2012.

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60 PTT E 63	Process Control in Textile Wet Processing

Category	L	T	P	Credit
EC	3	0	0	3

Objective

- To know the basics of process control
- To learn about the determination of fastness and finishing properties
- To understand the importance of eco friendly processing.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the importance of process control in chemical processing
CO2	Determine the fastness properties of textile fabrics
CO3	Determine the finishing properties of textile fabrics
CO4	Gain knowledge on computer colour matching
CO5	Understand the various methods in eco friendly process

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10

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K.S.Rangasamy College of Technology – Autonomous								R 2022
60 PTTE 63 – Process Control in Textile Wet Processing								
PTT : M. Tech Textile Technology								
Elective	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction to Process control Definition of Process control and Quality control – Need for quality control in textile wet processing – Flow charts indicating Process control and Quality control tests to be carried out in Desizing, Scouring, Bleaching, Souring, Mercerizing, Dyeing, Printing and finishing – Identification and estimation of residual starch – Determination of weight loss during Desizing and Scouring –Estimation of Residual Wax content and Total wax content by Soxhlet extraction method –Estimation of Copper number.	9
Determination of fastness properties Determination of ash content – Determination of Whiteness and Whiteness retention -Determination of Barium Activity number – Shrinkage of fabric – Determination of Light fastness by xenon Arc lamp – Determination of fastness to Washing – Determination of fastness to Dry and Wetrubbing – Determination fastness to Alkaline and Acidic Perspiration.	9
Determination of finishing properties Determination of efficiency of Water Proofing – Determination of efficiency of Flame Proofing – Determination of efficiency of Starching, by Bending length method – Determination of efficiency of Resin finishing by CRA. Estimation of residual formaldehyde present in resin finished fabric, Evaluation of efficiency of wetting agent by Sinking Time method – Evaluation of Dispersing agent – Evaluation of efficiency of detergents by Foam stability test – Identification of various fibres like Cotton, Viscose, Polyester, Wool, Acrylic and Nylon.	9
Computer colour matching system Estimation of Purity of dyes by Dyeing Trails and by using Spectrophotometer. Concept of Computer Colour matching – Advantages of Computer colour matching system and its limitations –Working principle of computer colour matching – Estimation of purity of Sodium Hydrosulphite, Sodium Nitrite, Sodium silicate – Estimation of strength of Hydrogen peroxide.	9
Eco-friendly processing Necessary of Eco-friendly processing – Concept of Eco-Friendly processing – The German Ban –List of banned Amines and Chemicals – Alternatives – Eco-labelling.-Tolerance limits of chemicals and auxiliaries in the export fabrics – Possible sources of contamination of red listed chemicals –ISO 14000 certification. Brief mention about the instruments used for measuring the various eco parameters.	9
	Hours: 45

Text book(s):

1.	AATCC Technical manual, 2008 Association of Textile chemists and Colorists. USA.
2.	Indian Standard Institution (Delhi) – ISI Handbook of Textile Testing, Indian Standards Inst., New Delhi, 2004

Reference(s):

1.	Orientation Programme on Wet Processing-Quality & Process Control, BITRA Publications,1986.
2.	Shenai V.A. – Technology of Textile Processing, Vol.8 Evaluation of Textile Chemicals, Edn.3,Sevak Publications, Mumbai 1995.
3.	Vaidya A.A. and Datye, K.K “Chemical processing of syntheticfibres and blends”, John Wiley and Sons, New York, 1995.

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60 PAC 001	ENGLISH FOR RESEARCH PAPER WRITING	Category	L	T	P	Credit
		PC	2	0	0	0

Objective

- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand that how to improve your writing skills and level of readability
CO2	Learn about what to write in each section
CO3	Understand the skills needed when writing a Title
CO4	Understand the skills needed when writing the Conclusion
CO5	Ensure the good quality of paper at very first-time submission

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	20	20
Apply	30	30
Analyse	0	0
Evaluate	0	0
Create	0	0

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCA 001 - English for Research Paper Writing								
Common to all Branches								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	C	E	Total
I / II	2	0	0	30	0	100	-	100

Introduction to Research Paper Writing Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	[6]
Presentation Skills Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction	[6]
Title Writing Skills Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check	[6]
Result Writing Skills Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	[6]
Verification Skills Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first time submission	[6]
Total Hours	**30**

Text Book(s):

1.	Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2	Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006

Reference(s):

1.	Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
2.	Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.
3.	Phill Williams, Advanced Writing skills for students of English, Rumian Publishers, 2018
4.	Sudhir S. Pandhye, English Grammar and Writing Skills, Notion Press, 2017.

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60 PAC 002	DISASTER MANAGEMENT	Category	L	T	P	Credit
		AC	2	0	0	0

Objective

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches Teach how to improve writing skills and level of readability

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Ability to summarize basics of disaster
CO2	Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO3	Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO4	Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO5	Ability to develop the strengths and weaknesses of disaster management approaches

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	20	20
Apply	30	30
Analyse	0	0
Evaluate	0	0
Create	0	0

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCA 002 – Disaster Management								
Common to all Branches								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I / II	2	0	0	30	0	100	-	100

Introduction Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.	[6]
Repercussions of Disasters and Hazards Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And	[6]
Disaster Prone Areas In India Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics	[6]
Disaster Preparedness and Management Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and other Agencies, Media Reports:	[6]
Risk Assessment Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.	[6]
Total Hours	**30**

Text Book(s):

1.	Goel S. L., Disaster Administration and Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi,2009.
2	Nishitha Rai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company,2007.

Reference(s):

1.	Sahni, Pardeep et.al.," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, 2001.
2.	Subramanian R,"Disaster Management", Vikas publishing Housing Pvt. Ltd., 2018.
3.	Chu-hua Kuei, Christian N Madu, Handbook of Disaster Management Risk Reduction & Management: Climate change and Natural Disaster, world scientific, 2017.
4.	Janki Andharia, Disaster studies: Exploring Intersectional ties in Disaster Discourse, Springer, 2020.

Passed in BoS Meeting held on 11/05/2023
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

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60 PAC 003	CONSTITUTION OF INDIA	Category	L	T	P	Credit
		AC	2	0	0	0

Objective

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional. Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolutionin1917and its impact on the initial drafting of the Indian Constitution.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India
CO3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO4	Discuss the passage of the Hindu Code Bill of 1956.
CO5	Discuss the role and functioning of election commission of India.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	20	20
Apply	30	30
Analyse	0	0
Evaluate	0	0
Create	0	0

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCA 003 – Constitution of India								
Common to all Branches								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I / II	2	0	0	30	0	100	-	100

History of Making of The Indian Constitution History, Drafting Committee, (Composition & Working)	[3]
Philosophy of The Indian Constitution Preamble, Salient Features	[3]
Contours of Constitutional Rights and Duties Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.	[6]
Organs of Governance Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.	[6]
Local Administration District's Administration head: Role and Importance Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.	[6]
Election Commission Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.	[6]
Total Hours	**30**

Text Book(s):

1.	The Constitution of India,1950 (Bare Act),Government Publication.
2	Busi S N, Ambedkar B R, "Framing of Indian Constitution",1st Edition, 2015.

Reference(s):

1.	Jain, M P, "Indian Constitution Law", 7th Edition, Lexis Nexis,2014
2.	Basu, D D, "Introduction to the Constitution of India", Lexis Nexis, 2015.
3.	Bhansali S R., "Textbook on The Constitution of India", Universal Publishers, 2015
4.	Jain, M P., "Outlines of Indian Legal and Constitutional History", Lexis Nexis, 2014

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