

ANNA UNIVERSITY:: CHENNAI
NON-AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY
REGULATIONS 2021
M.TECH. TEXTILE TECHNOLOGY
CHOICE BASED CREDIT SYSTEM
I TO IV SEMESTERS CURRICULA AND I SEMESTER SYLLABUS
SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATE- GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MA4158	Statistical Applications in Textile Engineering	FC	4	0	0	4	4
2.	TX4101	Theory of Short Staple Spinning	PCC	4	0	0	4	4
3.	TX4102	Advances in Fabric Formation	PCC	4	0	0	4	4
4.	TX4151	Polymer and Fibre Physics	PCC	3	0	0	3	3
5.	RM4151	Research Methodology and IPR	RMC	2	0	0	2	2
6.		Professional Elective I	PEC	3	0	0	3	3
7.		Audit Course – I *	AC	2	0	0	2	0
PRACTICALS								
8.	TX4161	Advanced Textile Testing Laboratory	PCC	0	0	6	6	3
TOTAL				22	0	6	28	23

*Audit Course is Optional

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	TX4201	Wetting and Wicking of Textile Materials	PCC	3	0	0	3	3
2.	TX4202	Yarn Quality Analysis	PCC	2	0	2	4	3
3.	TX4203	Fabric Quality Analysis	PCC	2	0	2	4	3
4.		Professional Elective II	PEC	3	0	0	3	3
5.		Professional Elective III	PEC	3	0	0	3	3
6.		Professional Elective IV	PEC	3	0	0	3	3
7.		Audit Course – II	AC	2	0	0	2	0
PRACTICALS								
8.	TX4211	Textile Product Engineering	EEC	0	0	8	8	4
TOTAL				18	0	12	30	22

*Audit Course is Optional

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Professional Elective V	PEC	3	0	0	3	3
2.		Professional Elective VI	PEC	3	0	0	3	3
3.		Open Elective	OEC	3	0	0	3	3
PRACTICALS								
4.	TX4311	Project Work I	EEC	0	0	12	12	6
TOTAL				9	0	12	21	15

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	TX4411	Project Work II	EEC	0	0	24	24	12
TOTAL				0	0	24	24	12

TOTAL NO. OF CREDITS: 72

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LIST OF PROFESSIONAL ELECTIVES

SEMESTER - I, ELECTIVE I

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TX4001	Alternative Spinning Systems	PEC	3	0	0	3	3
2.	TX4002	Shuttleless Weaving Technology	PEC	3	0	0	3	3
3.	TX4003	High Performance Textiles	PEC	3	0	0	3	3
4.	TX4004	Filtration Textiles	PEC	3	0	0	3	3

SEMESTER- II, ELECTIVE II

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TX4005	Process Control and Optimization in Yarn Spinning	PEC	3	0	0	3	3
2.	TX4006	Structure and Properties of Nonwovens	PEC	3	0	0	3	3
3.	TX4007	Enzyme Technology for Textile Processing	PEC	3	0	0	3	3
4.	TX4073	Protective Clothing	PEC	3	0	0	3	3

SEMESTER - II, ELECTIVE III

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TX4008	Structural Mechanics of Yarn	PEC	3	0	0	3	3
2.	TX4009	Structural Mechanics of Fabrics	PEC	3	0	0	3	3
3.	TX4010	Coated and Laminated Textiles	PEC	3	0	0	3	3
4.	TX4011	Colouration and Functional Finishes	PEC	3	0	0	3	3

SEMESTER - II, ELECTIVE IV

SI. No.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TX4012	Theory of Drafting	PEC	3	0	0	3	3
2.	TX4013	Clothing Science	PEC	3	0	0	3	3
3.	TX4014	Medical Textiles	PEC	3	0	0	3	3
4.	TX4074	Sustainability in Textile Industry	PEC	3	0	0	3	3

SEMESTER- III, ELECTIVE V

Sl. No.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TX4015	Theory of Twisting	PEC	3	0	0	3	3
2.	TX4016	Textiles in Civil Construction and Transportation	PEC	3	0	0	3	3
3.	TX4072	Functional Dyes	PEC	3	0	0	3	3
4.	TX4017	Pollution Abatement in Textile Industry	PEC	3	0	0	3	3

SEMESTER-III, ELECTIVE VI

Sl. No.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	TX4071	Characterization of Textile Polymers	PEC	3	0	0	3	3
2.	TX4075	Textile Reinforced Composites	PEC	3	0	0	3	3
3.	TX4018	Colour Science and its Applications	PEC	3	0	0	3	3
4.	TX4019	Design and Analysis of Textile Experiments	PEC	3	0	0	3	3

AUDIT COURSES - I (AC)

REGISTRATION FOR ANY OF THESE COURSES IS OPTIONAL TO STUDENTS

SL. NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS
			L	T	P	
1.	AX4091	English for Research Paper Writing	2	0	0	0
2.	AX4092	Disaster Management	2	0	0	0
3.	AX4093	Constitution of India	2	0	0	0
4.	AX4094	நற்றமிழ் இலக்கியம்	2	0	0	0

COURSE OBJECTIVES:

- To understand the basics of random variables and point estimation with emphasis on the standard distributions.
- To apply the small and large sample tests through Tests of hypothesis.
- To understand the concept of analysis of variance and use it to investigate non- parametric model.
- To monitor a process and detect a situation when the process is out of control.
- To apply the concept of analysis of variance and use it to investigate factorial dependence.

UNIT I PROBABILITY DISTRIBUTION AND ESTIMATIONS**12**

Applications of Binomial, Poisson, Normal, t, Exponential, Chi-square, F and Weibull distributions in textile engineering - Point estimates and interval estimations of the parameters of the distribution functions.

UNIT II HYPOTHESIS TESTING**12**

Sampling distribution - Significance tests applicable to textile parameters – Normal test, t - test, Chi - square test and F - test - p-values - Selection of sample size and significance levels with relevance to textile applications - Acceptance sampling.

UNIT III ANALYSIS OF VARIANCE AND NON-PARAMETRIC TESTS**12**

Analysis of variance for different models – Non - parametric tests - Sign test - Rank test - Concordance test.

UNIT IV PROCESS CONTROL AND CAPABILITY ANALYSIS**12**

Control charts for variables and attributes - Basis, Development, Interpretation, Sensitizing rules, Average run length - Process capability analysis.

UNIT V DESIGN AND ANALYSIS OF EXPERIMENTS**12**

2^k full-factorial designs - Composite designs - Robust designs - Development of regression Models - Regression coefficients - Adequacy test - Process optimizations.

TOTAL: 60 PERIODS**COURSE OUTCOMES:**

At the end of the course, students will be able to

- Analyze the performance in terms of probabilities, distributions and point estimation achieved by the determined solutions.
- Apply the basic principles underlying statistical inference (estimation and hypothesis testing).
- Demonstrate the knowledge of applicable large sample theory of estimators and tests.
- Identify the applicable sample theory of estimators and tests.
- Obtain a better understanding of the importance of the methods in modern industrial processes.

REFERENCES:

1. Douglas C. Montgomery, "Design and analysis of experiments", 8th Edition, John Wiley & Sons, Singapore, 2013.
2. Leaf G.A.V., "Practical Statistics for the Textile Industry, Part I and II", the Textile Institute, Manchester, 1984.
3. Montgomery D.C., "Introduction to Statistical Quality Control", 6th Edition, John Wiley and Sons, Singapore, 2009.
4. Ronald D. Moen, Thomas W. Nolan, Lloyd P. Provost, "Quality improvement through planned experimentation", 3rd Edition, McGraw-Hill, 2012.

COURSE OBJECTIVES:

- To enable the students to learn the theory of various operations carried out at different stages of yarn spinning, which would be helpful them in understanding the influence of various parameters on quality and productivity of short staple yarn.

UNIT I FIBRE DISPERSION AND CLEANING**12**

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; the new approaches to improve fibre-dispersion in carding operation; mechanism of removal of short fibre and trash in comb.

UNIT II FIBRE STRAIGHTENING, NEPS REMOVAL**12**

Theory of hook formation; measurement of fibre extent, influence of fibre extent on yarn quality; improvement of fibre-extent by carding, drafting and combing actions; generation of neps, neps removal in carding and combing

UNIT III ATTENUATION**12**

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

UNIT IV TWISTING**12**

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, 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.

UNIT V FIBRE BLENDING AND LEVELLING**12**

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.

TOTAL: 60 PERIODS**COURSE OUTCOMES:**

Upon completion of this course, the student shall have the knowledge on

CO1: Theory of opening and cleaning in spinning preparatory machinery

CO2: Theory of generation of hooks, neps and rectification

CO3: Wire and roller drafting, technology involved, their limitations and scope for improvement

CO4: Theory of twisting in different systems of yarn spinning

CO5: Fibre blending and leveling carried out at different stages of yarn production process

REFERENCES:

1. Klein W., "The Rieter Manual of Spinning, Vol.1", Rieter Machine Works Ltd., Winterthur, 2014, ISBN 10 3-9523173-1-4 / ISBN 13 978-3-9523173-1-0.
2. Klein W., "The Rieter Manual of Spinning, Vol.2", Rieter Machine Works Ltd., Winterthur, 2014, ISBN 10 3-9523173-2-2 / ISBN 13 978-3-9523173-2-7.
3. Klein W., "The Rieter Manual of Spinning, Vol.1-3", Rieter Machine Works Ltd., Winterthur, 2014, ISBN 10 3-9523173-3-0 / ISBN 13 978-3-9523173-3-4.
4. Lord P.R., "Yarn Production: Science, Technology and Economics", The Textile Institute, Manchester, 1999.
5. Iredale John A., "Yarn Preparation: A Handbook", Intermediate Technology, London, 1992, ISBN:1853390429.
6. Salhotra K.R. and Chattopadhyay R., "Book of papers on Blow room, Card", Indian Institute of Technology, Delhi, 1998.
7. Haw J., "Short-staple Ring Spinning", Textile Progress, The Textile Institute, Manchester, 1982
8. Grosberg P. and Iype C, "Yarn Production: Theoretical Aspects", Textile Institute, 1999, ISBN: 1870372034.
9. Carl A. Lawrence., "Fundamentals of Spun Yarn Technology", CRC press, 2003, ISBN 1-56676-821-7
10. Eric Oxtoby, "Spun Yarn Technology ", Butterworth, Boston, London, 1987, ISBN: 0408014644/9780408014649

TX4102

ADVANCES IN FABRIC FORMATION

LTPC
4004

COURSE OBJECTIVES:

To enable the students to learn about

- Advances in fabric formation and their structural features, characteristics and application

UNIT I WOVEN FABRICS

12

Principle of fabric formation and fabric structure - circular woven fabrics, narrow fabric; advances in 3-D woven fabrics – principle of hollow, shell and nodal fabric formations; Noobing – principle and fabric structure; applications.

UNIT II KNITTED FABRICS

12

Advances in circular knitting – loop transfer, seamless knitting and sliver knitting techniques; 3- D knitted fabrics – circular and flat weft knit techniques, applications; spacer fabrics – weft and warp knit techniques, applications.

UNIT III BRAIDED FABRICS

12

Principle and production of 3-D braided structures – Cartesian braiding, rotary braiding, and hexagonal; advances in track and column braiding – production of tubular and bifurcated structure; applications.

UNIT IV NONWOVENS

12

Principle and Production of Complex nonwoven structures using various nonwoven production routes; Nonwovens with submicron fibres for technical applications

UNIT V SMART FABRICS**12**

Definition and classifications; production and development of smart fibre and yarn; smart fabric structure and preparation – weaving, knitting and braiding technique; applications; Auxetic fabrics – principles, production and applications

TOTAL: 60 PERIODS**COURSE OUTCOMES:**

Upon completion of this course, the student shall be able to understand

CO1: advancement in weaving and 3D weaving techniques

CO2: advanced knit structures and techniques

CO3: advancements in braiding techniques

CO4: advancements in Nonwoven Structures

CO5: smart fabric and their production methods

REFERENCES:

1. John McLoughlin and Tasneem Sabir, "High-Performance Apparel" Woodhead Publishing Limited, 2018
2. Xiaogang Chen, "Advances in 3 D Textiles" Woodhead Publishing Limited, 2015
3. K. F. Au, "Advances in knitting technology" Woodhead Publishing Limited, 2011
4. George Kellie, Advances in Technical Nonwovens, Woodhead Publishing Limited, 2016
5. Savvas Vassiliadis, Advances in Modern Woven Fabrics Technology, InTech publications, 2011, Yordan Kyosev, Recent Developments in Braiding and Narrow Weaving, Springer, 2016

TX4151**POLYMER AND FIBRE PHYSICS****L T P C
3 0 0 3****COURSE OBJECTIVES:**

To enable the students to learn about

- Fibre forming polymer characteristics and their related models and models describing fibre structure.
- Conducting of experiments to characterize the polymers and fibres

UNIT I BASIC CONCEPTS**9**

Synthetic fibre forming polymers, definition, terms and fundamental concepts of polymerization; molecular architecture in polymers-configuration and conformation, molecular weight and its influence on fibre formation

UNIT II POLYMER PROPERTIES**9**

Glass transition temperature (T_g), factors affecting T_g , WLF equation; rubber elasticity; melting and crystallization, polymer solutions- solubility parameter and its significance to fibre spinning.

UNIT III FLUID FLOW AND MASS TRANSFER**9**

Newton's law of viscosity, velocity distribution in flow systems Newtonian and non-newtonian fluids; mass transfer operations: Fick's law of diffusion, solid-liquid extraction and drying operations with application to polymer chips.

UNIT IV VISCOELASTICITY**9**

Deformation of elastic solid, viscoelasticity and its measurement, non-linear viscoelasticity, yield behavior of solids and breaking phenomena

UNIT V PROPERTIES OF FIBRES

9

Mechanical properties of natural and synthetic fibres; moisture sorption behavior of natural and synthetic fibres; Thermal, Frictional and optical properties of fibres

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of this course, the student shall

CO1: Be able to understand the synthesis of polymers

CO2: Be able to correlate the properties of polymers

CO3: Be able to understand rheological characteristics

CO4: Know about viscoelastic behavior of polymers

CO5: Be able to correlate the properties of fiber

REFERENCES:

1. Billmeyer, "Textbooks of Polymer Science", 3rd ed., Wiley, 1984.
2. Sperling, "Introduction to Physical Polymer Science", Wiley, 1986.
3. Odian, "Principle of Polymerization", 3rd ed., Wiley, 1991
4. Gordon, "High Polymers", Addison-Wesley, 1963.
5. Gupta.V.B. and Kothari V.K., "Man Made Fibre Production", Chapman and Hall, 1985
6. Kothari V.K., "Textile Fibres: Developments and innovations", IAFL Publication, 2000
7. Hongu T. and Philips G., "New Fibres", Wood Head Publishing Ltd,1997
8. Xiangwu Zhang, "Fundamentals of Fiber Science", DEStech Publications, Inc, 2014
9. Donald G. Baird, Dimitris I. Collias, "Polymer Processing: Principles and Design", Wiley Edition, 2014.
10. Walczak Z.K., "Processes of Fiber formation", Elsevier Science,2002.
11. V R Gowariker., NV Viswanathan.,Jayadev Sreedhar., "Polymer science", New age International Publishers, 2020

RM4151

RESEARCH METHODOLOGY AND IPR

L T P C
2 0 0 2

UNIT I RESEARCH DESIGN

6

Overview of research process and design, Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys.

UNIT II DATA COLLECTION AND SOURCES

6

Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying.

UNIT III DATA ANALYSIS AND REPORTING

6

Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT IV INTELLECTUAL PROPERTY RIGHTS**6**

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.

UNIT V PATENTS**6**

Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filing, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents.

TOTAL : 30 PERIODS**REFERENCES:**

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
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. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.

TX4161**ADVANCED TEXTILE TESTING LABORATORY****L T P C
0 0 6 3****COURSE OBJECTIVES:**

To enable the students to learn about

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

LIST OF EXPERIMENTS

1. Determination / Analysis of Molecular weight determination using GPC
2. Rheological studies using viscometer
3. Determination of MFI
4. Determination / Analysis of Birefringence measurement
5. Determination / Analysis of Creep and Stress relaxation of filament
6. Determination / Analysis of DSC Thermogram of different fibres
7. Determination / Analysis of Thermograms using TGA
8. Analysis - FTIR and NMR graphs
9. Determination / Analysis of crystallinity by XRD
10. Determination of residual formaldehyde in fabrics
11. Evaluation of Flame retardant finish
12. Evaluation of Water repellent finish
13. Evaluation of conductivity of fabrics
14. Determination of surface tension of liquids
15. Determination / Analysis of contact angle for porous substrates

TOTAL: 90 PERIODS

COURSE OUTCOMES:

Upon the completion of this course the student will be able to

CO1: Understand and analyze the characteristics of textile materials using advanced characterizing techniques

CO2: Analyze the graphs, charts of TGA, FTIR spectrometer and X-ray Diffractometer

CO3: Evaluate fabric finishes and nature of fabrics

CO4: Determine the property of liquids

CO5: Characterize the porous substrates

TX4001

ALTERNATIVE SPINNING SYSTEMS

L T P C

3 0 0 3

COURSE OBJECTIVES:

To enable the students to learn the

- Theory of yarn formation by rotor, friction, air-jet, air vortex and other spinning systems and
- Effect of process parameters used in the spinning system on yarn quality and production

UNIT I ROTOR SPINNING I

9

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

UNIT II ROTOR SPINNING II

9

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; structure property relationship

UNIT III FRICTION SPINNING

9

Principle of yarn formation - DREF-2, DREF-3 spinning systems; developments in friction spinning systems, raw material requirement, theory of yarn formation, effect of process variables on yarn quality, application of these machines for different end products, economics; technological limitations; structure property relationship.

UNIT IV AIR-JET AND AIRVORTEX SPINNING

9

Description of yarn production in air-jet spinning machine; structure and quality of the air-jet spun yarn, raw materials requirement, process variables; theory of yarn formation by Air vortex system, raw material requirement and structure; structure property relationship

UNIT V OTHER SPINNING TECHNOLOGIES

9

Production of yarn in PLYfil, self-twist, electrostatic, Bobtex spinning systems; working details of production of double-rove yarns, wrap yarns and core spun yarns; raw material requirement in these systems; economics of these methods of yarn production; yarn characteristics and their applications; structure property relationship

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of this course, the student shall be able to understand the

CO1: Theory of yarn formation in open end spinning and production of yarn in rotor spinning system

CO2: Design of important elements of rotor spinning machine

CO3: Theory of yarn formation in friction spinning system and structure of yarn

CO4: Theory of yarn formation in air-jet and Air vortex spinning system and structure of yarns

CO5: Principle of yarn production by other spinning systems and double rove spinning

REFERENCES:

1. Oxtoby E., "Spun Yarn Technology", Butter worths London,1987.
2. Klein W., "New Spinning Methods ", The Textile Institute, Manchester, 1993.
3. Dyson E., "Rotor Spinning, Technical and Economics Aspects ", Textile Trade Press, New Mills, Stock Port, 1975.
4. Salhotra K.R. and Ishtiaque S.M., "Rotor Spinning; its advantages ", Limitations and Prospects in India, ATIRA, Ahmedabad, 1995.
5. Lord P.R, " Yarn Production; Science, Technology and Economics ", The Textile Institute, Manchester, 1999.
6. Trommer G., "Rotor Spinning", Meliand Textile benchte GmbH, Rohrbacher, 1995.
7. Lawrence C.A and Chen K.Z., "Rotor Spinning ", Textile Progress, The Textile Institute, Manchester, 1984.
8. Lawrence C. A., "Advances in yarn spinning technology" Wood head publishing, 2010,ISBN-13: 978 1 84569 444 9.
9. Klein W., "Rieter Manual of spinning", Vol.5&6, Rieter Machine Works, Winterthur,2014.

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TX4002

SHUTTLELESS WEAVING TECHNOLOGY

**L T P C
3 0 0 3**

COURSE OBJECTIVES:

- To enable the students to understand different mechanisms of weft insertion, their advantages and limitations

UNIT I INTRODUCTION

9

Introduction to shuttleless weaving; advantages of shuttleless weaving, comparison with shuttle weaving; features of unconventional weaving; different selvages: tucked-in, leno, fused, stitched, their mechanism of formation, their characteristics and uses; weft accumulator.

UNIT II PROJECTILE WEAVING MACHINE

9

Basic principle of projectile weaving; feeding of yarn to projectile; sequence of weft insertion; cam driven shedding; dwelling sley beat-up; torsion bar picking; energy utilization during picking.

UNIT III RAPIER WEAVING MACHINE

9

Classification based on type of rapier; system of weft insertion and number of rapiers; Sequence of weft insertion for Gabler and Dewas systems, their comparison; driving of flexible and rigid rapiers; asynchronized rapier timing; rapier buckling.

UNIT IV AIR-JET AND WATER-JET WEAVING MACHINES**9**

Principle of weft insertion in air-jet weaving, air requirements; path of the yarn on loom; sequence of weft insertion; control of air stream by relay nozzle, confuser profile reed and suction; design of air jet nozzle, air drag force, factors affecting drag force; principle of weft insertion in water-jet weaving machine, path of the yarn on loom, quality of water required, sequence of weft insertion; design of water jet nozzle, merits and demerits of water jet weaving; fabric drying on loom

UNIT V MULTIPHASE WEAVING**9**

Technological developments – models & features; functional description of multi-linear shedweaving – shed formation, filling insertion, beat-up, let-off, take-up and selvedge motion; characteristics of multi-linear shed weaving machine; circular and narrow fabric weaving

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

Upon completion of this course, the students will be able to know

CO1: Overview of shuttleless weaving technology

CO2: Principle, concepts and features of projectile weaving machine

CO3: Mechanisms of picking in rapier weaving machine

CO4: Mechanisms of picking and merits and demerits of air jet, water jet

CO5: Principle of fabric formation in multiphase weaving machine

REFERENCES:

1. Weaving Technology and Operations, Allaan Ormerod and Walter S. Sondhelm, The Textile Institute, 1995, ISBN 1 870812 76 X
2. Adanur.S, "Handbook of Weaving", Textile Institute, 2000.
3. Ormerod A, "Modern Preparation and Weaving Machinery", Butterworth's & Co., London, 1983.
4. Adanur.S, "Handbook of Weaving", Textile Institute, 2000.
5. Ormerod A, "Modern Preparation and Weaving Machinery", Butterworth's & Co., London, 1983.
6. Talukdar M K, Sriramulu P K, Ajgaonkar D B, "Weaving Machines, Mechanisms, Management" ISBN: 8185401160, Mahajan Publishers Pvt. Ltd., 2004.
7. Ormerod .A and Sondhelm.W.S, "Weaving Technology & Operations", Textile Institute Publication, 1995.
8. Khatwani P A, "Weaving II: Shuttleless looms", NCUTE Publication, 1999.
9. Marks and Robinson, "Principles of Weaving", Textile Institute, Manchester, 1976.

TX4003**HIGH PERFORMANCE TEXTILES****L T P C
3 0 0 3****COURSE OBJECTIVE:**

- To enable the students to learn about advanced spinning technology for manufacturing high performance fibres, their properties and applications

UNIT I FUNDAMENTALS OF HIGH PERFORMANCE FIBRES**9**

Fundamentals of high performance fibres; comparison of regular and high performance fibres; fibre forming process; manufacturing, properties and applications - aramid fibres, high performance polyethylene,

UNIT II	INORGANIC AND CARBON FIBRES	9
Manufacturing, properties and applications - glass fibres, basalt fibres; carbon fibres, ceramic fibres		
UNIT III	BIODEGRADABLE FIBRES	9
Manufacturing, properties and applications - alginate fibres; chitosan fibres; regenerated protein fibres – silk, wool, casein, soy bean fibre; synthetic biodegradable fibres		
UNIT IV	CHEMICAL AND THERMAL RESISTANT FIBRES	9
Manufacturing, properties and applications of chemical resistance fibres – chlorinated fibres, fluorinated fibres, PPS, PEEK and PEI; thermal resistant fibres – semi carbon fibres, PBI, PBO		
UNIT V	SPECIALIZED FIBRES	9
Manufacturing, properties and applications - hollow fibres, profile fibres blended and bi-component fibres, film fibres; functionalization of fibres – methods and applications		
TOTAL: 45 PERIODS		

COURSE OUTCOMES:

Upon completion of this course, the student shall be able to understand

CO1: Method of producing high performance fibres

CO2: High performance fibres for industrial applications

CO3: Manufacturing of biodegradable and protein fibres and their properties

CO4: Manufacturing of chemical resistant fibres and their properties

CO5: Manufacturing of specialty fibres and their properties

REFERENCES:

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, 1995.
3. Hearle J. W. S., "High Performance Fibres", Woodhead Publishing Ltd., Cambridge, England, 2001.
4. Hongu T. and Phillips G.O., "New Fibres", Woodhead Publishing Ltd., England, 1997
5. Carl. A Lawrence., "High performance textiles and its applications", Woodhead Publishing Ltd., ISBN: 978-1-84569-180-6., 2014.

PROGRESS THROUGH KNOWLEDGE

TX4004	FILTRATION TEXTILES	L T P C
		3 0 0 3

COURSE OBJECTIVES:

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

UNIT I	BASIC PRINCIPLES	9
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.		

UNIT II TEXTILE FILTERS & FINISHING TREATMENTS**9**

Fabric construction -woven fabrics, needle felts, knitted fabrics; heat setting, singeing, raising, calendaring, chemical treatments, special surface treatments

UNIT III LIQUID AND OIL FILTRATION**9**

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

UNIT IV TEXTILE FILTER IN SOLID-LIQUID SEPARATION**9**

Introduction, fabric design/selection consideration, filtration equipment, considerations; yarn types and fabric constructions - monofilaments, multi filaments, fibrillated tape (split film) yarns, staple-fibre yarns, yarn combinations; fabric constructions and properties - plain weave, twill weaves, satin weaves, duplex and semi duplex weaves, link fabrics, needle felts

UNIT V GAS FILTRATION**9**

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.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

Upon completion of this course, the student shall be able to understand

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

REFERENCES:

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

AUDIT COURSES

AX4091

ENGLISH FOR RESEARCH PAPER WRITING

L T P C
2 0 0 0

COURSE OBJECTIVES:

- 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

UNIT I INTRODUCTION TO RESEARCH PAPER WRITING

6

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II PRESENTATION SKILLS

6

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT III TITLE WRITING SKILLS

6

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

UNIT IV RESULT WRITING SKILLS

6

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

UNIT V VERIFICATION SKILLS

6

Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first-time submission

TOTAL: 30 PERIODS

COURSE OUTCOMES:

- 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

REFERENCES

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
3. Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
4. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.

COURSE OBJECTIVES:

- 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

UNIT I INTRODUCTION**6**

Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II REPERCUSSIONS OF DISASTERS AND HAZARDS**6**

Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT III DISASTER PRONE AREAS IN INDIA**6**

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

UNIT IV DISASTER PREPAREDNESS AND MANAGEMENT**6**

Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V RISK ASSESSMENT**6**

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

TOTAL : 30 PERIODS**COURSE OUTCOMES:**

- 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

REFERENCES:

1. Goel S. L., Disaster Administration And Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi,2009.
2. NishithaRai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "NewRoyal book Company,2007.
3. Sahni, PardeepEt.Al. ," Disaster Mitigation Experiences And Reflections", Prentice Hall OfIndia, New Delhi,2001.

AX4093

CONSTITUTION OF INDIA

L T P C
2 0 0 0

COURSE OBJECTIVES

Students will be able to:

- 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.

UNIT I HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History, Drafting Committee, (Composition & Working)

UNIT II PHILOSOPHY OF THE INDIAN CONSTITUTION

Preamble, Salient Features

UNIT III 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.

UNIT IV 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.

UNIT V LOCAL ADMINISTRATION

District's Administration head: Role and Importance, □Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy(Different departments), Village level:Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT VI 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.

TOTAL: 30 PERIODS

COURSE OUTCOMES

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- 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.
- Discuss the passage of the Hindu Code Bill of 1956.

SUGGESTED READING

1. The Constitution of India,1950(Bare Act),Government Publication.
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
3. M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

AX4094

நற்றமிழ் இலக்கியம்

L T P C
2 0 0 0

UNIT I

சங்க இலக்கியம்

6

1. தமிழினதுவக்கநூல்தொல்காப்பியம்
- எழுத்து, சொல், பொருள்
2. அகநானூறு(82)
- இயற்கைஇன்னிசைஅரங்கம்
3. குறிஞ்சிப்பாட்டின்மலர்க்காட்சி
4. புறநானூறு(95,195)
- போரைநிறுத்தியஒளவையார்

UNIT II

அறநெறித்தமிழ்

6

1. அறநெறிவகுத்ததிருவள்ளுவர்
- அறம்வலியுறுத்தல், அன்புடைமை, ஒப்புறவுஅறிதல், ஈகை, புகழ்
2. பிறஅறநூல்கள்- இலக்கியமருந்து
- ஏலாதி, சிறுபஞ்சமூலம், திரிகடுகம், ஆசாரக்கோவை
(தூய்மையைவலியுறுத்தும்நூல்)

UNIT III

இரட்டைக்காப்பியங்கள்

6

- 1.கண்ணகியின்புரட்சி
- சிலப்பதிகாரவழக்குரைகாதை
2. சமூகசேவைஇலக்கியம்மணிமேகலை
- சிறைக்கோட்டம்அறக்கோட்டமாகியகாதை

UNIT IV**அருள்நெறித்தமிழ்****6**

1. சிறுபாணாற்றுப்படை
 - பாரிமுல்லைக்குத்தேர்கொடுத்தது, பேகன் மயிலுக்குப் போர்வை கொடுத்தது, அதியமான்ஒளவைக்குநெல்லிக்கனிகொடுத்தது, அரசர் பண்புகள்
2. நற்றிணை
 - அன்னைக்குரியபுன்னைசிறப்பு
3. திருமந்திரம் (617, 618)
 - இயமம்நியமம்விதிகள்
4. தர்மச்சாலையை நிறுவிய வள்ளலார்
5. புறநானூறு
 - சிறுவனேவள்ளலானான்
6. அகநானூறு (4) - வண்டு
 நற்றிணை (11) - நண்டு
 கலித்தொகை (11) - யானை, புறா
 ஐந்திணை 50 (27) - மான்
 ஆகியவைபற்றியசெய்திகள்

UNIT V**நவீனதமிழ்இலக்கியம்****6**

1. உரைநடைத்தமிழ்,
 - தமிழின்முதல்புதினம்,
 - தமிழின்முதல்சிறுகதை,
 - கட்டுரைஇலக்கியம்,
 - பயணஇலக்கியம்,
 - நாடகம்,
2. நாட்டுவிடுதலைபோராட்டமும்தமிழ்இலக்கியமும்,
3. சமுதாயவிடுதலையும்தமிழ்இலக்கியமும்,
4. பெண் விடுதலையும் விளிம்பு நிலையினரின் மேம்பாட்டில் தமிழ் இலக்கியமும்,
5. அறிவியல்தமிழ்,
6. இணையத்தில்தமிழ்,
7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம்.

TOTAL: 30 PERIODS**தமிழ்இலக்கியவெளியீடுகள் / புத்தகங்கள்**

1. தமிழ்இணையகல்விக்கழகம் (Tamil Virtual University) - www.tamilvu.org
2. தமிழ்விக்கிப்பீடியா (Tamil Wikipedia) - <https://ta.wikipedia.org>
3. தர்மபுரஆதினவெளியீடு
4. வாழ்வியல்களஞ்சியம் - தமிழ்ப்பல்கலைக்கழகம், தஞ்சாவூர்
5. தமிழ்கலைக்களஞ்சியம் - தமிழ்வளர்ச்சித்துறை (thamilvalarchithurai.com)
6. அறிவியல்களஞ்சியம் - தமிழ்ப்பல்கலைக்கழகம், தஞ்சாவூர்