KUMARAGURU COLLEGE OF TECHNOLOGY,

An autonomous institution affiliated to Anna University, Chennai

COIMBATORE – 641 049.

B.TECH., TEXTILE TECHNOLOGY

REGULATIONS 2018

Batch of 2021-25 onwards

CURRICULUM AND SYLLABI

I to VIII Semesters

Department of Textile Technology

VISION

To be a **Centre of Excellence** in **textile technology and management** with basic and applied research for the fulfilment of societal needs.

MISSION

- **Develop industry relevant curriculum,** innovative teaching and project-based learning methods that enables students to be efficient professionals.
- **Motivate Faculty** to update their knowledge and skills through continuous learning.
- **Provide holistic student development** by creating opportunities for lifelong learning and to develop entrepreneurship skills.
- **Undertake inter-disciplinary research** and development/Internship/Consultancy in the field of Textile Technology to support the industry and society.

Program Educational Objectives (PEOs)

Graduates of the B. Tech - Textile Technology Programme will be able to:

PEO: 1 Hold leadership responsibilities in Textile and related segments such as product development, production, technical services, quality assurance and marketing.

PEO: 2 Become successful entrepreneur in Textile and related field and contributing to societal, technological and industry development.

PEO: 3 Partake professional qualifications/ certifications in Textile Technology related areas by pursuing specialized studies in engineering and business.


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Program Outcomes (PO's)

Graduates of the Textile Technology Undergraduate Program should have the ability to:

PO 1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Understand the impact of professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development.

PO 8: Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.

PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO.10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.


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PO 11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO's)

Graduates of the Textile Technology Undergraduate Program will have the ability to:

PSO1: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization for Process Optimization, Cost and Value analysis, Productivity improvement, Solutions to quality issues and Product development in textile and related fields.

PSO2: Demonstrate learned techniques, experiments, modern engineering tools and software to estimate the optimum utilization of resources such as raw materials, machineries, manpower and to predict the properties of fibre, yarn, fabric and garments as per the end uses.


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B.TECH TEXTILE TECHNOLOGY

CURRICULUM

Semester I										Pre-requisite
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18MAI1201	Linear Algebra and Calculus	Embedded - Theory & Lab	BS	3	0	2	0	4	-
2	U18ENI1201	Fundamentals of Communication-I	Embedded - Theory & Lab	HS	2	0	2	0	3	-
3	U18 PHI1201	Engineering Physics	Embedded - Theory & Lab	BS	3	0	2	0	4	-
4	U18TXT1001	Introduction to Textiles	Theory	PC	2	0	0	0	2	-
5	U18MEI1201	Engineering Graphics	Embedded - Theory & Lab	ES	2	0	2	0	3	-
6	U18CSI1202	Problem solving and programming using ‘C ‘	Embedded - Theory & Lab	ES	2	0	2	0	3	-
7	U18INI1600	Engineering Clinic I	Practical & Project	ES	0	0	4	2	3	-
Total Credits									**22**	
Total Contact Hours/week									**30**	

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Semester II										Pre-requisite
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18ENI2201	Fundamentals of Communication –II	Embedded - Theory & Lab	HS	2	0	2	0	3	U18ENI1201
2	U18MAI2201	Advanced Calculus and Laplace Transforms	Embedded - Theory & Lab	BS	3	0	2	0	4	-
3	U18CHI2201	Engineering Chemistry	Embedded - Theory & Lab	BS	3	0	2	0	4	-
4	U18CSI2201	Python Programming	Embedded - Theory & Lab	ES	2	0	2	0	3	-
5	U18TXI2201	Textile Fibers	Embedded - Theory & Lab	PC	2	0	2	0	3	U18TXT1001
6	U18MEP2501	Engineering Practices Lab	Lab	ES	0	0	2	0	1	-
7	U18INI2600	Engineering Clinic II	Practical & Project	ES	0	0	4	2	3	U18INI1600
Total Credits									**21**	
Total Contact Hours/week									**30**	

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Semester III										Pre-requisite
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18MAT3103	Probability and Statistics	Theory & Tutorial	BS	3	1	0	0	4	-
2	U18EII3203	Measurements and Instrumentation	Embedded - Theory & Lab	PC	3	0	2	0	4	-
3	U18TXT3001	Physical Properties of Textile Fibres	Theory	PC	3	0	0	0	3	-
4	U18TXI3202	Yarn Manufacturing Technology I	Embedded - Theory & Lab	PC	3	0	2	0	4	-
5	U18TXT3003	Fabric Manufacture-I	Theory	PC	3	0	0	0	3	-
6	U18TXP3504	Fabric Manufacture I Lab	Lab	PC	0	0	2	0	1	-
7	U18INI3600	Engineering Clinic III	Practical & Project	ES	0	0	4	2	3	-
								Total Credits	**22**	
								Total Contact Hours/week	**28**	

Semester IV										Pre-requisite
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18MAT4102	Numerical Methods	Theory and Tutorial	BS	3	1	0	0	4	-
2	U18MET4007	Basics of Mechanical Engineering	Theory	ES	3	0	0	0	3	-
3	U18TXT4001	Yarn Manufacturing Technology II	Theory	PC	3	0	0	0	3	U18TXI3202
4	U18TXI4202	Fabric Manufacture-II	Embedded - Theory & Lab	PC	3	0	2	0	4	U18TXT3003
5	U18TXI4203	Woven Fabric Structure and Design	Embedded - Theory & Lab	PC	3	0	2	0	4	U18TXT3003
6	U18TXP4504	Yarn Manufacturing Technology Lab	Lab	PC	0	0	2	0	1	U18TXI3202
7	U18INI4600	Engineering Clinic IV	Practical & Project	ES	0	0	4	2	3	U18INI3600
								Total Credits	**22**	
								Total Contact Hours/week	**28**	

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Semester V										Pre-requisite
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18TXT5001	Mechanics of Textile Machinery	Theory	ES	3	0	0	0	3	U18MET4007
2	U18TXT5002	Textile and Apparel Quality Evaluation	Theory	PC	3	0	0	0	3	U18TXI4202
3	U18TXT5003	Textile Chemical Processing-I	Theory	PC	3	0	0	0	3	U18TXI4202
4	U18TXT5004	Knitting Technology	Theory	PC	3	0	0	0	3	-
5	U18TXT5005	Protective Textiles	Theory	PC	3	0	0	0	3	-
6	U18TXP5505	Textile Chemical Processing Lab-I	Lab	PC	0	0	2	0	1	U18TXI4202
6	U18TXE….	Professional Elective-I	Theory	PE	3	0	0	0	3	-
8	U18TXO5….	Open Elective-I	Theory	OE	3	0	0	0	3	-
9	U18TXP5506	Textile and Apparel Quality Evaluation Lab	Lab	PC	0	0	2	0	1	U18TXI4202
								Total Credits	**23**	
								Total Contact Hours/week	**28**	

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Semester VI										Pre-requisite
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18TXI6201	Garment Manufacturing Technology	Embedded - Theory & Lab	PC	2	0	2	0	3	-
2	U18TXI6202	Textile Chemical Processing-II	Embedded - Theory & Lab	PC	3	0	2	0	4	U18TXT5003
3	U18TXT6003	Process Control in Spinning and Weaving	Theory	PC	3	0	0	0	3	U18TXT5002
4	U18TXE….	Professional Elective-II	Theory	PE	3	0	0	0	3	-
5	U18TXE…	Professional Elective-III	Theory	PE	3	0	0	0	3	-
6	U18TXO6….	Open Elective-II	Theory	OE	3	0	0	0	3	-
								Total Credits	**19**	
								Total Contact Hours/week	**21**	

Semester VII										Pre-requisite
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18TXT7001	Technical Textiles	Theory	PC	3	0	0	0	3	U18TXI4202
2	U18TXT7002	Textile and Apparel Costing	Theory	PC	3	0	0	0	3	U18TXI6201
3	U18TXT7003	Textile Mill Management	Theory	PC	3	0	0	0	3	U18TXT6003
4	U18TXE….	Professional Elective-IV	Theory	PE	3	0	0	0	3	-
5	U18TXP7504	Textile and Apparel CAD Lab	Lab	PC	0	0	2	0	1	U18TXI6201
6	U18TXP7505	Testing of Technical Textiles Lab	Lab	PC	0	0	2	0	1	U18TXP5506
7	U18TXP7706	Project - Phase I	Project	PR	0	0	0	6	3	U18INI5600
								Total Credits	**17**	
								Total Contact Hours/week	**22**	

Semester VIII										
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C	Prerequisite
1	U18TXP8701	Project - Phase II	Project	PR	0	0	0	24	12	U18TXP7706
								Total Credits	**12**	
								Total Contact Hours/week	**24**	

Total Credits	**158**

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List of Mandatory Courses					
S.No.	**Course Code**	**Course Title**	**CT**	**Semester**	**Credits**
1	U18CHT3000	Environmental Science and Engineering	MC	3	0
2	U18INT4000	Constitution of India	MC	4	0
3	U18VET4101	Universal Human Values - II	HS	4	3

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Programme Electives									
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
Fibres, Yarn & Fabric									
1	U18TXE0001	Manufactured Fiber Technology	Theory	PE	3	0	0	0	3
2	U18TXE0002	High Performance Fibers	Theory	PE	3	0	0	0	3
3	U18TXE0003	Manufacture of Specialty Yarns and Fabrics	Theory	PE	3	0	0	0	3
4	U18TXE0004	Computer Applications in Textiles	Theory	PE	3	0	0	0	3
5	U18TXE0005	Sustainability in Textile Manufacturing and Material	Theory	PE	3	0	0	0	3
Processing & Garments									
6	U18TXE0006	Apparel Production Planning and Control	Theory	PE	3	0	0	0	3
7	U18TXE0007	Garment Processing	Theory	PE	3	0	0	0	3
8	U18TXE0008	Textile Marketing and Merchandising	Theory	PE	3	0	0	0	3
9	U18TXE0009	Clothing Science	Theory	PE	3	0	0	0	3
Technical Textiles									
10	U18TXE0010	Nano and Smart Materials in Textiles	Theory	PE	3	0	0	0	3
11	U18TXE0011	Textile Composites	Theory	PE	3	0	0	0	3
12	U18TXE0012	Bio Polymers and Medical Textiles	Theory	PE	3	0	0	0	3
13	U18TXE0013	Testing of Functional and Technical Textiles	Theory	PE	3	0	0	0	3
Management & Entrepreneurship									
14	U18TXE0014	Textile Project Management and Finance	Theory	PE	3	0	0	0	3
15	U18TXE0015	Entrepreneurship Development in Textiles	Theory	PE	3	0	0	0	3
16	U18TXE0016	Industrial Engineering for Textile and Apparel Industry	Theory	PE	3	0	0	0	3

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Specialty Textiles									
17	U18TXE0017	Specialty Knits	Theory	PE	3	0	0	0	3
18	U18TXE0018	Automobiles and Filtration Textiles	Theory	PE	3	0	0	0	3
19	U18TXE0019	Geotextiles	Theory	PE	3	0	0	0	3
21	U18TXE0021	Global Logistics Management	Theory	PE	3	0	0	0	3
Proto-Sem Courses									
22	U18TXE0022	Innovation Practices For Product Development	Theory	PE	0	0	3	0	3
23	U18TXE0023	Fashion Marketing Management	Theory	PE	3	0	0	0	3

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List of One credit Courses

S. No.	Course Code	Course Title
1.	U18TXC001	Work Study in Sewing Line
2.	U18TXC002	Retail Management
3.	U18TXC003	Fancy Yarns
4.	U18TXC004	Erection and Commissioning of Textile Machinery
5.	U18TXC005	Workload and Work Assignments
6.	U18TXC006	ERP in Textiles
7.	U18TXC007	Export Documentation
8.	U18TXC008	Fashion Brand Management
9.	U18TXC009	Weft knitted fabric analysis and calculations
10.	U18TXC010	IoT and Application in Spinning Mill
11.	U18TXC011	Unconventional/Smart/Multifunctional Textile Finishing
12.	U18TXC012	Industrial Engineering Techniques
13.	U18TXC013	Value Stream Mapping
14.	U18TXC014	Filters and Filtration Textiles
15.	U18TXC015	Technology of Long Fiber Spinning
16.	U18TXC016	Recycling in Textiles
17	U18TXC017	Lean Management
18	U18TXC018	Cotton: From Farm to industry


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SEMESTER I


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U18MAI1201 LINEAR ALGEBRA AND CALCULUS

(Common to All branches – 2018 batch only)

L	T	P	J	C
3	0	2	0	4

Course Outcomes (COs)

After successful completion of this course, the students should be able to:

CO1: Identify eigenvalues and eigenvectors and apply Cayley Hamilton theorem.
CO2: Apply orthogonal diagonalization to convert quadratic form to canonical form.
CO3: Solve first order ordinary differential equations and apply them to certain physical situations.
CO4: Solve higher order ordinary differential equations.
CO5: Evaluate the total derivative of a function, expand the given function as series and locate the maximum and minimum for multivariate function.
CO6: Determine Rank, Inverse, Eigenvalues, Eigenvectors of the given matrix, Maxima-Minima of the function and Solving Differential equations using MATLAB.

Pre-requisite: NIL

CO-POs & PSOs Mapping
S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S			M				M	M		M		
CO2	S	S			M				M	M		M		
CO3	S	S			M				M	M		M		
CO4	S	S			M				M	M		M		
CO5	S	S			M				M	M		M		
CO6	S	S			M				M	M		M		

Course Assessment methods:

Direct

1. Continuous Assessment Test I, II (Theory component)
2. Open Book Test; Cooperative Learning Report, Assignment; Journal Paper Review, Group Presentation, Project Report, Poster Preparation, Prototype or Product
3. Demonstration etc (as applicable) (Theory component)
4. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
5. Model Examination (lab component)
6. End Semester Examination (Theory and lab components)


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Indirect
1. Course-end survey

THEORY COMPONENT

MATRICES **6 Hours**

Rank of a matrix – Consistency of a system of linear equations - Rouche's theorem - Solution of a system of linear equations - Linearly dependent and independent vectors– Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley Hamilton theorem (excluding proof)

DIAGONALISATION OF A REAL SYMMETRIC MATRIX **6 Hours**

Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS **11 Hours**

Leibnitz's equation – Bernoulli's equation – Equations of first order and higher degree - Clairauts form – Applications: Orthogonal trajectories.

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS **11 Hours**

Linear equations of second and higher order with constant coefficients – Euler's and Legendre's linear equations – Method of variation of parameters – First order Simultaneous linear equations with constant coefficients – Applications.

FUNCTIONS OF SEVERAL VARIABLES **11 Hours**

Total derivative – Taylor's series expansion – Maxima and minima of functions of two variables – Constrained maxima and minima: Lagrange's multiplier method with single constraints – Jacobians.

REFERENCES

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 41st Edition, 2011.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
3. Kreyzig E., "Advanced Engineering Mathematics", Tenth Edition, John Wiley and sons, 2011.

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4. Veerarajan T., Engineering Mathematics (for First Year), Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised Edition, 2007

5. Kandasamy P., Thilagavathy K., and Gunavathy K., "Engineering Mathematics", S. Chand & Co., New Delhi, (Reprint) 2008

6. Venkataraman M.K., "Engineering Mathematics", The National Pub. Co., Chennai,2003

7. Weir, MD, Hass J, Giordano FR: Thomas' Calculus, Pearson education 12th Edition, 2015

8. P.Bali., Dr. Manish Goyal., Transforms and partial Differential equations, University Science Press, New Delhi, 2010

9. G.B.Thomas and R.L.Finney, Calculus and analytical geometry, 11th Edition, PearsonEducation, (2006)

LAB COMPONENT **30 Hours**

List of MATLAB Programmes:

1. Introduction to MATLAB.
2. Matrix Operations - Addition, Multiplication, Transpose, Inverse
3. Rank of a matrix and solution of a system of linear equations
4. Characteristic equation of a Matrix and Cayley-Hamilton Theorem.
5. Eigenvalues and Eigenvectors of Higher Order Matrices
6. Curve tracing
7. Solving first order ordinary differential equations.
8. Solving second order ordinary differential equations.
9. Determining Maxima and Minima of a function of one variable.
10. Determining Maxima and Minima of a function of two variables.

Theory: 45	Tutorial: 0	Practical: 30	Project: 0	Total: 75 Hours


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U18ENI1201 – FUNDAMENTALS OF COMMUNICATION-I
(Common to all Branches of I Semester B.E/B/Tech Programmes)

L	T	P	J	C
2	0	2	0	3

Course Objectives:

1. To communicate effectively by using appropriate grammar and technical parlance in a range of academic scenarios.
2. To interpret and critically evaluate discourses related to functional English.
3. To disseminate professional information through appropriate means of communication.

Course Outcomes: (COs)

After the course the student will be able to:

CO1: Communicate in English with correct grammar.
CO2: Communicate effectively (Oral and Written).
CO3: Use communication skills in the real world.

Assessment Methods:

Direct
1. Continuous Assessment of Skills 2. Assignment 3. Written Test 4. End Semester Examination
Indirect
1. Course-end survey

REFERENCES:

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1										S		S		
CO2		M		W		W			M	S		S		
CO3		M		M		W			M	S		S		

1. A Modern Approach to Non Verbal Reasoning (English, Paperback, Dr. R S Aggarwal)


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No	Topic	Hours
	MODULE I - 12 Hrs	
1.1	Parts of Speech	2
1.2	Subject Verb Agreement	2
1.3	Speak up (Self Introduction, JAM)	4
1.4	Writing sentences using 'Be-forms'	3
1.5	Test	1
	MODULE II - 12Hrs	
2.1	Articles, Gerunds, Infinitives	2
2.2	Speak up (Greetings & Polite English)	4
2.3	Dialogue Writing	3
2.4	Skimming & Scanning	2
2.5	Listening Skills - I	1
	MODULE III - 12 Hrs	
3.1	Tenses & Voice	2
3.2	Sentences & its kinds	2
3.3	Speak up (Narration & Description)	4
3.4	Summarizing & Note-making	3
3.5	Listening Skills - II	1
	MODULE IV - 12 Hrs	
4.1	Framing Questions – 4 types	2
4.2	Speak up (Role play)	4
4.3	Letter writing – Formal and Informal & Email Writing	3
4.4	Reading Comprehension & Cloze test	2
4.5	Listening Skills - III	1
	MODULE V - 12 Hrs	
5.1	Degrees of Comparison	2
5.2	Clauses	2
5.3	Speak up (Power Point Presentation)	4
5.4	Writing (Picture perception)	3
5.5	Test	1
	Total	**60 Hours**

2. The Power of Words(Bloomsbury, UK, 2012, Hyacinth Pink)
3. Word Power Made Easy: The Complete Handbook for Building a Superior Vocabulary (By Norman Lewis)
4. Effective Technical Communication Tata Mc Graw Hills Publications (Ashraf Rizvi)
5. English and Soft skills Orient Black Swan Publishers (S. P. Dhanavel)
6. Know Your Grammar: Trans.in Tamil & Malayalam –A Bilingual Approach (Bloomsbury, UK, 2012, Hyacinth Pink)

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U18 PHI1201 ENGINEERING PHYSICS

(Common to All B.E., B .Tech.)

L	T	P	J	C
3	0	2	0	4

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Understand the principles of motion and rotation of a rigid body in the plane.

CO2: Enhance the fundamental knowledge in properties of matter and its applications relevant to various streams of Engineering and Technology.

CO3: Recognise the nature and role of the thermodynamic parameters.

CO4: Compute electrostatic field and electric potential due to point and distributed charges.

CO5: Use electrostatic & magneto static boundary conditions to relate fields in adjacent media.

CO6: Introduce and provide a broad view of the smart materials and Nano science to undergraduates.

Pre-requisites : NIL

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	M										M		
CO2	S	M			S							M		
CO3	S	M			S							M		
CO4	S	M			S							M		
CO5	S	M			S							M		
CO6	S	M					M					M		

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Course Assessment methods

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation, 3. Pre/Post - experiment Test/Viva; Experimental Report for each experiment (lab component) 4. Model examination (lab component) End Semester Examination (Theory and lab component)
Indirect
1. Course-end survey

Theory Component

KINEMATICS & RIGID BODY MOTION **9 Hours**

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples.

PROPERTIES OF MATTER AND MATERIALS TESTING **9 Hours**

Properties of matter: Hooke's Law Stress - Strain Diagram - Elastic moduli - Relation between elastic constants - Poisson's Ratio - Expression for bending moment and depression - Cantilever - Expression for Young's modulus by Non-uniform bending and its experimental determination.

Materials testing: Mechanism of plastic deformation, slip and twinning – types of fracture – Vickers Hardness test - fatigue and creep test.

HEAT **9 Hours**

Specific heat capacity, thermal capacity. Temperature rise. Coefficient of linear thermal expansion. Methods of measurement of thermal expansion. Thermal stresses in composite structures due to


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non-homogeneous thermal expansion. Applications -The bimetallic strip. Expansion gaps and rollers in engineering structures. Thermal conductivity: differential equation of heat flow. Lee's disc apparatus for determination of thermal conductivity. Thermal Insulation. Convection and radiation. Applications to refrigeration and power electronic devices.

ELECTROSTATICS & MAGNETOSTATICS 10 Hours

ELECTROSTATICS : Maxwell's equation for electrostatics – E due to straight conductors, circular loop, infinite sheet of current - electric field intensity (D) - Electric potential - dielectrics - dielectric polarization - internal field – Clasious - Mosotti equation - dielectric strength - applications.

MAGNETOSTATICS: Maxwell's equation for magnetostatics - B in straight conductors, circular loop, infinite sheet of current - Lorentz force, magnetic field intensity (H) – Biot–Savart's Law – Ampere's Circuit Law –Magnetic flux density (B) – magnetic materials – Magnetization – Applications.

NEW ENGINEERING MATERIALS AND NANO TECHNOLOGY 8 Hours

New Engineering Materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

Nano Materials: synthesis - Ball milling - Sol-gel - Electro deposition — properties of nano particles and applications. – Carbon Nano Tubes – fabrication by Chemical Vapour Deposition - structure, properties & applications.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

REFERENCES

1. Elements of Properties of Matter, Mathur D.S., Shyamlal Charitable Trust, New Delhi, 1993.
2. Properties of matter, Brijlal and Subharamaniam, S.Chand and Co, New Delhi, 2004.
3. Fundamentals of General Properties of Matter by Gulati H.R., R. Chand & Co., New Delhi, 1982.
4. Engineering Mechanics (2nd ed.), Harbola M. K., Cengage publications, New Delhi, 2009.

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5. Introduction to Mechanics, Verma M. K. (CRC Press), University Press, 2000.
6. Thermodynamics: An Engineering Approach (SI Units), yunus a. cengel & michael a. boles 7^{th} edition, mcgraw-hill companies 2014.
7. Engineering Electromagnetics, W. H. Hayt and John A. Buck, 6th Edition, Tata McGraw Hill, New Delhi, 2014.
8. Electromagnetic Field Theory, 5th Edition, Gangadhar K.A. and Ramanathan P.M., Khanna Publishers, New Delhi, 2013.
9. Problems and Solutions in Electromagnetics, 1st Edition, J.A. Buck and W. H. Hayt, Tata McGraw Hill, New Delhi, 2010.
10. Theory and Problems of Electromagnetic Schaum's Outline Series, 5th Edition, Joseph A. Edminister, Tata McGraw Hill Inc., New Delhi, 2010.
11. Engineering Physics, Rajendran V., Tata McGraw-Hill Education Pvt. Ltd., 2010
12. Nano – the Essentials, Pradeep T., McGraw-Hill Education, Pvt. Ltd., 2007.


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Lab component:

LIST OF EXPERIMENTS

1. Determination of thermal conductivity of a bad conductor - Lee's disc
2. Determination of Acceleration due to Gravity – Compound Pendulum
3. Determination of wavelength of light, Numerical aperture and acceptance of optical fibre
4. Determination of band gap of a semiconductor
5. Determination of compressibility of a given liquid - Ultrasonic Interferometer
6. Determination of thickness of thin sheet – Air wedge
7. Determination of frequency of an electrically maintained turning fork – Melde's string
8. Determination of wavelength of mercury source using diffraction grating - Spectrometer
9. Determination of solar cell efficiency using Lux Meter
10. Determination of Young's Modulus – Non-uniform bending

Experiments for Demonstration:

1. Hall effect
2. Hardness Test
3. Four probe experiment
4. Hysteresis curve

Theory: 0	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 30 Hours**

REFERENCES

1. Laboratory Manual of Engineering Physics, Dr. Y. Aparna & Dr. K. Venkateswara Rao, V.G.S Publishers.
2. Practical Physics, G.L. Squires, Cambridge University Press, Cambridge, 1985.
3. Great Experiments in Physics, M.H. Shamos, Holt, Rinehart and Winston Inc., 1959.
4. Experiments in Modern Physics, A.C. Melissinos, Academic Press, N.Y., 1966.

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U18TXT1001 INTRODUCTION TO TEXTILES

L	T	P	J	C
2	0	0	0	2

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Compare different types of textile industry in India and the world along with their market size.

CO2: Identify the different types of fibres and their properties.

CO3: Discuss the different types of yarn formation process.

CO4: Outline the classification of fabric manufacturing and applications.

CO5: Understand the fabric finishing processes and garment production.

Pre-requisites : NIL

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	W											W		
CO2	S	M											M	
CO3	M	M											M	
CO4	S	M					W						M	
CO5													M	

Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Open book test; Assignment; Journal paper review, Group Presentation, 3. End Semester Examination
Indirect
1. Course-end survey

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OVERVIEW OF THE TEXTILE INDUSTRY **6 Hours**

History of textiles. Types of textile industries, Textile industry around the world , Positioning of Indian Textile Industry, Different categories of Textile Products, Overview of Textile Process

FIBRES **6 Hours**

Introduction to the different types of textile fibres (plant, animal, fur, mineral, artificial, al synthetic). Basic terminology used to denote the fibre properties.

SPINNING AND YARNS **6 Hours**

Preparation and spinning of main types of natural fibres; Different spinning techniques: Ring spinning & Rotor Spinning, *Yarn and its properties.*

FABRIC FORMATION **6 Hours**

Weaves and Weaving: Introduction to the main types of hand and machine looms (flat, vertical, backstrap, treddle, warp-weighted, draw, jacquard, etc; introduction to the main types of weaves and finishes).

Knitting : Warp knitting, Weft Knitting and their variations, Introduction to felt, crochet, braids, laces, etc.

Non-Woven : Introduction to the main forms of non-woven materials, Different techniques and applications of nonwovens

DYEING AND OTHER DECORATIVE TECHNIQUES **6 Hours**

Introduction to the main types of plant, animal, mineral, synthetic dyes and dyeing techniques. Introduction to the main forms of decorative techniques:(a) printed (batik, block, plate, roller, screen; computer); (b) applied (appliqué; embroidery; braids, bands and tassels; sequins, spangles, beads; etc).

Theory: 30	**Tutorial: 0**	**Practical:0**	**Project: 0**	**Total: 30 Hours**

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REFERENCES:

1. Motivate series “Textiles” by a A-Wynne, Macmillan Education Ltd, London.
2. Lord P.R. and Mohammed M.H., “Weaving – Conversion of Yarn to Fabric”, Merrow Publication, 2001
3. Trotman, E.R., “Dyeing and Chemical Technology of Textile Fibres”, Charles Griffin and Co. Ltd., London. 1991.
4. Hand Book of Nonwovens – Edited by S.J.Russell, Wood head publications Ltd., ISBN-13: 978-1-85573-603-0, 2007.

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U18MEI1201 ENGINEERING GRAPHICS

L	T	P	PJ	C
2	0	2	0	3

(Common to AE, AUE, CE, MCE, ME, EIE, EEE and TXT)

Course Outcomes (COs)

At the end of the course, the student will be able to:

CO1: Construct various plane curves.

CO2: Construct projection of points and projection of lines.

CO3: Develop projection of surfaces and solids.

CO4: Solve problems in sections of solids and development of surfaces.

CO5: Apply free hand sketching and concepts of isometric in engineering practice.

CO6: Draw engineering drawing in AutoCAD with dimensions.

Pre-requisites: Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	M												M
CO2	S	S									W			M
CO3	S	S									M			M
CO4	S	S												M
CO5	S	S												M
C06	S													M

DIRECT

1. Continuous Assessment Test I, II (Theory component)
2. Open Book Test, Assignment, Group Presentation
3. Viva, Experimental Report for each Experiment (lab Component)
4. Model Examination (lab component)
5. End Semester Examination (Theory and lab components)

INDIRECT

1. Course-end survey

PLANE CURVES, PROJECTION OF POINTS, LINES AND PLANES 10 Hours

Importance of graphics in design process, visualization, communication, documentation and drafting tools, Construction of curves - ellipse, parabola, and hyperbola by eccentricity method only. Orthographic projection of points.

Projections of straight lines located in first quadrant - determination of true length and true inclinations.


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Projections of plane surfaces - polygonal lamina and circular lamina, located in first quadrant and inclined to one reference plane.

PROJECTION AND SECTION OF SOLIDS 10 Hours

Projection of simple solids - prism, pyramid, cylinder and cone. Drawing views when the axis of the solid is inclined to one reference plane.

Sectioning of simple solids - prisms, pyramids, cylinder and cone. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane.

DEVELOPMENT OF SURFACES, ISOMETRIC PROJECTIONS AND FREE-HAND SKETCHING 10 Hours

Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.

Isometric projection, Isometric scale, Isometric views of simple solids, truncated prisms, pyramids, cylinders and cones.

Free hand sketching techniques, sketching of orthographic views from given pictorial views of objects, including free-hand dimensioning.

INTRODUCTION TO AUTOCAD 15 Hours

Introduction to Drafting Software (AutoCAD) & its Basic Commands. Introduction to coordinate systems, object selection methods, selection of units and precession. sketching – line, circle, arc, polygon, rectangle and ellipse. Working with object snaps, layers and object properties. Editing the objects – copy, move, trim, extend, working with arrays, mirror, scale, hatch, fillet and chamfer.

ISOMETRIC VIEWS WITH AUTOCAD 15 Hours

Building drawings – Single and double bed room house (sectional Top view only). Introduction to Motion path animation. Isometric views of simple solid blocks.

Theory: 30	**Tutorial: 0**	**Practical:30**	**Project: 0**	**Total : 60 Hours**

REFERENCES

1. Basant Agrawal and CM Agrawal, Engineering Drawing, McGraw-Hill, New Delhi, First Edition, 2008.

2. Venugopal K. and Prabhu Raja V., Engineering Graphics, New Age International (P) Limited, New Delhi, 2008.

3. Nataraajan K.V., Engineering Drawing and Graphics, Dhanalakshmi Publisher, Chennai, 2005.

4. Warren J. Luzadder and Jon. M. Duff, Fundamentals of Engineering Drawing, Prentice Hall of India Pvt. Ltd., New Delhi, Eleventh Edition, 2005.

5. Gopalakirishna K.R., Engineering Drawing (Vol. I & II), Subhas Publications, 2001.

6. James Leach, AutoCAD 2017 Instructor, SDC Publications, 2016.

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U18CSI1202 PROBLEM SOLVING AND PROGRAMMING USING C

L	T	P	J	C
2	0	2	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Acquire knowledge on different problem-solving techniques. (K3)
CO2: Use appropriate data types and control structures for solving a given problem. (K4)
CO3: Execute different array and string operations. (K4)
CO4: Experiment with the usage of pointers and functions. (K4)
CO5: Organize data using structures and unions. (K4)

Pre-requisites : Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	M							L				M	M
CO2	S	M							L	L				
CO3	S	L			L	L			L	L		L		
CO4	M	L	M	**L**	L	L			L	L		M		
CO5	M	L	M	**L**	L	L			L	L		M		

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II (Theory Component)
2. Assignment (Theory Component)
3. Group Presentation (Theory Component)
4. Pre/Post - experiment Test/Viva; Experimental Report for each experiment (lab component)
5. Model examination (lab component)
6. End Semester Examination (Theory and lab component)

INDIRECT

1. Course-end survey


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THEORY COMPONENT CONTENTS

STRUCTURED PROGRAMMING **6 Hours**

Algorithms, building blocks of algorithms (instructions/statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration). Introduction to C Programming – Operators and Expressions – Data Input and Output – Control Statements.

ARRAYS AND STRINGS **6 Hours**

Defining an array – Processing an array –Multidimensional Arrays Character Arithmetic – Defining a string – Initialization of Strings – Reading and Writing Strings – Processing Strings – Searching and Sorting of Strings

FUNCTIONS, STORAGE CLASSES **6 Hours**

Defining a function – Accessing a function – Function prototypes – Passing arguments to a function – Passing arrays to functions – Function with string - Recursion – Storage classes

POINTERS **7 Hours**

Pointer Fundamentals – Pointer Declaration – Passing Pointers to a Function – Pointers and one dimensional arrays – operations on pointers– Dynamic memory allocation.

STRUCTURES AND UNIONS **5 Hours**

Structures and Unions: Defining a Structure – Processing a Structure – User defined data types (Typedef) – Unions

Theory: 30	Tutorial: 0	Practical: 0	Project: 0	Total: 30 Hours

REFERENCES

1. Byron S Gottfried and Jitendar Kumar Chhabra, “Programming with C”, Tata McGraw Hill Publishing Company, Third Edition, New Delhi, 2011.
2. Pradip Dey and Manas Ghosh, “Programming in C”, Second Edition, Oxford University Press, 2011.
3. Kernighan,B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2006
4. Ashok N. Kamthane, “Computer programming”, Pearson Education, 2007.
5. Reema Thareja, “Programming in C”, Second Edition, Oxford University Press, 2011.

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LAB COMPONENT CONTENTS

LIST OF EXPERIMENTS **30 Hours**

1. Writing algorithms, flowcharts and pseudo codes for simple problems.
2. Programs on expressions and conversions
3. Programs using if, if-else, switch and nested if statements
4. Programs using while, do-while, for loops
5. Programs on one dimensional arrays, passing arrays to functions and array operations
6. Programs using two dimensional arrays, passing 2D arrays to functions
7. Programs using String functions
8. Programs using function calls, recursion, call by value
9. Programs on pointer operators, call by reference, pointers with arrays
10. Programs using structures and unions.

Theory: 0	Tutorial: 0	Practical: 30	Project: 0	Total: 30 Hours

REFERENCES

1. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, New Delhi, 2011.
2. Pradip Dey and Manas Ghosh, "Programming in C", Second Edition, Oxford University Press, 2011.
3. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006
4. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007.
5. Reema Thareja, "Programming in C", Second Edition, Oxford University Press, 2011.

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U18INI1600 ENGINEERING CLINIC - I

L	T	P	J	C
0	0	4	2	3

Course objectives

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

Course Outcomes (COs)

After successful completion of this course, the students should be able to:

CO1: Identify a practical problems and find a solution.
CO2: Understand the project management techniques.
CO3: Demonstrate their technical report writing and presentation skills.

Pre-requisite: Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S	S	S	S	M	W		S			S		
CO2											S			
CO3										S				

Course Assessment methods:

Direct	Indirect
1.Project reviews 50% 2.Workbook report 10% 3.Demonstration & Viva-voce 40%	1. Course Exit Survey

Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the


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course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the first semester, students will focus primarily on IOT with C programming using Audino.

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

Total Hours: 90


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SEMESTER-II


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U18ENI2201 – FUNDAMENTALS OF COMMUNICATION - II
(Common to all branches of II Semester B.E/B/Tech Programmes)

L	T	P	J	C
2	0	2	0	3

Course Objectives:

1. To effectively use the basic language skills to imbibe technical language skills.
2. To hone written and spoken competencies leading to effective communication.
3. To comprehend, use and explain technical data and information.

Course Outcomes: (COs)

After the course the student will be able to:

CO1: Read, understand, and interpret material on technology.

CO2: Communicate knowledge and information through oral and written medium.

CO3: Compare, collate and present technical information according to the audience and purpose.

Assessment Methods

Direct
1. Continuous Assessment of Skills 2. Assignment 3. Written Test 4. End Semester Examination
Indirect
1. Course-end survey

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1		W		S					S	S		S		
CO2				S					S	S		W		
CO3				M					S	S		S		

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No	TOPIC	
	MODULE I	**12 Hrs**
1.1	Introduction to Technical Writing Technical Definitions	2
1.2	Writing Instructions / Instruction Manual	2
1.3	Writing Recommendations	2
1.4	Speaking Activity I	6
	MODULE II	**12 Hrs**
2.1	Process Writing	2
2.2	Review Writing I - Product	2
2.3	Review Writing II – Article	2
2.4	Speaking Activity II	6
	MODULE III	**12 Hrs**
3.1	Interpreting and Transcoding Graphics	2
3.2	Types of Report / Writing a Report	2
3.3	Reading & Responding to texts	2
3.4	Speaking Activity III	6
	MODULE IV	**12 Hrs**
4.1	Drafting a project proposal	2
4.2	Listening to technical talks	2
4.3	Preparing a survey Questionnaire	2
4.4	Speaking Activity IV	6
	MODULE V	**12 Hrs**
5.1	Writing Memos, Circulars, Notices	2
5.2	Writing Agenda and Minutes	2
5.3	Inferential Reading	2
5.4	Speaking Activity V	6
		Total 60 Hours

REFERENCES:

1. Technical English Workbook, VRB Publishers Pvt. Ltd (Prof. Jewelcy Jawahar, Dr.P.Ratna)
2. Effective Technical Communication, Tata McGraw Hills Publications (Ashraf Rizvi)
3. Technical Communication – English Skills for Engineers, Oxford Higher Education (Meenakshi Raman, Sangeeta Sharma)

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U18MAI2201 ADVANCED CALCULUS AND LAPLACE TRANSFORMS

(Common to All branches)

L	T	P	J	C
3	0	2	0	4

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Evaluate double and triple integrals in Cartesian coordinates and apply them to calculate area and volume.

CO2: Apply various integral theorems for solving engineering problems involving cubes and rectangular parallelepipeds.

CO3: Construct analytic functions of complex variables and transform functions from z-plane to w-plane and vice-versa, using conformal mappings.

CO4: Apply the techniques of complex integration to evaluate real and complex integrals over suitable closed paths or contours.

CO5: Solve linear differential equations using Laplace transform technique.

CO6: Determine multiple integrals, vector differentials, vector integrals and Laplace transforms using MATLAB.

Pre-requisites: Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S			M							M	M	
CO2	S	S			M							M	M	
CO3	S	S			M							M	M	
CO4	S	S			M							M	M	
CO5	S	S			M							M	M	
CO6	S	S			M							M		

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II (Theory component)
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc (as applicable) (Theory component)
3. Pre/Post - experiment Test/Viva; Experimental Report for each experiment (lab component)
4. Model examination (lab component)
5. End Semester Examination (Theory and lab component)

INDIRECT

1. Course-end survey


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THEORY COMPONENT

MULTIPLE INTEGRALS **9 Hours**

Double integration – Cartesian coordinates – Change of order of integration - Triple integration in Cartesian coordinates – Applications: Area as double integral and Volume as triple integral.

VECTOR CALCULUS **9 Hours**

Gradient, divergence and curl – Directional derivative – Irrotational and Solenoidal vector fields - Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Verification of theorem and simple applications.

ANALYTIC FUNCTIONS **9 Hours**

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy- Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs)– Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : $w = z + c$, cz , $1/z$ – Bilinear Transformation

COMPLEX INTEGRATION **9 Hours**

Cauchy's integral theorem – Cauchy's integral formula –Taylor's and Laurent's series – Singularities –Residues –Residue theorem –Application of residue theorem for evaluation of real integrals – Contour Integration (excluding poles on the real axis).

LAPLACE TRANSFORMS **9 Hours**

Definition - Properties: Superposition, Shift in t or Time Delay, Shift in s, Time Derivatives, Time Integral-Initial Value Theorem - Final Value Theorem - Transform of periodic functions - Inverse transforms - Convolution theorem – Applications: Solution of linear ordinary differential equations of second order with constant coefficients.

REFERENCES

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 41st Edition, 2011.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
3. Veerarajan T., Engineering Mathematics (for First Year), Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised Edition, 2007.
4. Kandasamy P., Thilagavathy K., and Gunavathy K., "Engineering Mathematics", S. Chand & Co., New Delhi, (Reprint) 2008.
5. Kreyzig E., "Advanced Engineering Mathematics", Tenth Edition, John Wiley and sons, 2011.
6. Venkataraman M.K., "Engineering Mathematics", The National Pub. Co., Chennai, 2003.
7. Weir, MD, Hass J, Giordano FR: Thomas' Calculus Pearson education 12th ED, 2015.

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LAB COMPONENT **30 Hours**

List of MATLAB Programmes:

1. Evaluating double integral with constant and variable limits.
2. Area as double integral
3. Evaluating triple integral with constant and variable limits
4. Volume as triple integral
5. Evaluating gradient, divergence and curl
6. Evaluating line integrals and work done
7. Verifying Green's theorem in the plane
8. Evaluating Laplace transforms and inverse Laplace transforms of functions including impulse.
9. Heaviside functions and applying convolution.
10. Applying the technique of Laplace transform to solve differential equations.

Theory: 45	Tutorial: 0	Practical: 30	Project: 0	Total: 75 Hours


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U18CHI2201	ENGINEERING CHEMISTRY (Common to All Branches)	L	T	P	J	C
		3	0	2	0	4

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Apply the basic principles of chemistry at the atomic and molecular level.

CO2: Analyze the impact of engineering solutions from the point of view of chemical principles.

CO3: Apply the chemical properties to categorize the engineering materials and their uses.

CO4: Integrate the chemical principles in the projects undertaken in field of engineering and technology.

CO5: Develop analytical proficiency through lab skill sets to demonstrate in professional practice.

Pre-requisites : Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	M												
CO2	S	M		M										
CO3	S	M		S										
CO4	S	M		S										
CO5	M	S		S										

Course Assessment methods

Direct

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc (as applicable)
3. End Semester Examination

Indirect

1. Course-end survey

Theory Component

CHEMICAL BONDING **7 Hours**

Bonding: Introduction – Ionic bonding - Van der Waal's forces (dipole - dipole, dipole - induced dipole, induced dipole - induced dipole interactions) - hydrophobic interaction.

Bonding in organic molecules: covalent and co-ordinate bonds (overview only) - hydrogen bonding and its consequences.


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THERMODYNAMICS **7 Hours**

Introduction - Thermodynamic process – Internal energy – Enthalpy – limitations of First law of thermodynamics – Second law of thermodynamics - Entropy - Third law of thermodynamics – Free Energy and Work Function – Clausius-Clapeyron equation – Maxwell's relations – Kirchhoff's equation.

ELECTROCHEMISTRY AND CORROSION **7 Hours**

Electrodes - Electrode Potential – Nernst equation and problems - Galvanic cell - Electrochemical Series.

Corrosion: Classification and mechanism of chemical and electrochemical corrosion - Factors influencing corrosion

Corrosion control: Inhibitors – Cathodic protection (Sacrificial anodic protection, Impressed current cathodic protection) – Protective coating: Electroplating (Au) and Electroless plating (Ni).

WATER TECHNOLOGY **6 Hours**

Introduction - soft/hard water - Disadvantages of hard water in industries– scale, sludge, priming and foaming, caustic embrittlement.

Treatment of hard water: External treatment (Ion exchange method) - Internal treatment (colloidal, carbonate, phosphate and calgon conditioning) - Desalination (Reverse osmosis, Electrodialysis)

ENGINEERING MATERIALS **9 Hours**

Polymer: Introduction – Preparation, Properties and Applications of PMMA, PET, PVC.

Composites: Constituents of Composites – Polymer Composites - Metal Matrix Composites - Ceramic Matrix Composites – Applications

Lubricants: Classification - Functions - Properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud point and pour point) - Semi solid lubricant (greases with calcium based, sodium based, lithium based) - Solid lubricants (graphite, molybdenum disulphide)

SURFACE CHEMISTRY AND CATALYSIS **9 Hours**

Adsorption: Types of adsorption – Adsorption isotherms: Freundlich's adsorption isotherm – Langmuir's adsorption isotherm – Applications of adsorption on pollution abatement.

Catalysis: Catalyst – catalytic poisoning and catalytic promoters - autocatalysis –- acid base catalysis – enzyme catalysis – Michaelis-Menten equation – applications.

Chemical kinetics: Introduction – first order, pseudo first order, second order, zero order equations – parallel reactions – opposing reactions.

Theory: 45	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

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REFERENCES

1. Jain P.C. and Jain. M., Engineering Chemistry, 16th Edition, Dhanpat Rai Publishing Company, New Delhi, Reprint 2017.
2. Puri B.R., Sharma L.R., Pathania, M.S. Principles of physical chemistry, Vishal Publishing Co., 2017
3. Atkins, P. and de Paula, J., Atkin's Physical Chemistry, 9th ed., Oxford Univ. Press, 2009.
4. Glasstone S., An introduction to Electrochemistry, 10th Edition, Affiliated to East West Press Private Limited, 2007.
5. Samir Sarkar., Fuels and Combustion, 3rd Edition, Orient Longman, India, 2009.
6. Dara S.S. and Umare S.S., A text book of Engineering Chemistry, S.Chand and Company Limited, New Delhi, 2014.
7. Engineering Chemistry, Wiley India Editorial Team, Wiley, 2018.

LABORATORY COMPONENT

LIST OF EXPERIMENTS

1. Preparation of Standard solutions
2. Conductometric estimation of mixture of acids vs strong base
3. Estimation of extent of corrosion of Iron pieces by Potentiometry
4. Estimation of the extent of dissolution of Copper / Ferrous ions by spectrophotometry.
5. Estimation of acids by pH metry.
6. Determination of total, temporary and permanent hardness by EDTA method.
7. Estimation of DO by Winkler's method
8. Estimation of Alkalinity by Indicator method.
9. Estimation of Chloride by Argentometric method
10. Estimation of Sodium and Potassium in water by Flame photometry.
11. Determination of Flash and Fire point of lubricating oil
12. Determination of Cloud and Pour point of lubricating oil
13. Determination of relative and kinematic viscosities of lubricating oil at different temperatures
14. Determination of corrosion rate on mild steel by Weight loss method
15. Morphological studies of corrosion on mild steel by microscopic techniques

Theory: 0	**Tutorial: 0**	**Practical: 30**	**Project: 0**	**Total: 30 Hours**

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REFERENCES

1. Jeffery G.H., Bassett J., Mendham J. and Denny R.C., Vogel's Text Book of Quantitative Chemical Analysis, Oxford, ELBS, London,2012.
2. Shoemaker D.P. and C.W. Garland., Experiments in Physical Chemistry, Tata McGraw-Hill Pub. Co., Ltd., London,2003.

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U18CSI2201

L	T	P	J	C
2	0	2	0	3

PYTHON PROGRAMMING

(Common to All Branches)

Course Outcomes (COs)

AFTER SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENTS SHOULD BE ABLE TO:

CO1: Classify and make use of python programming elements to solve and debug simple logical problems.(K4,S3)
CO2: Experiment with the various control statements in Python.(K3,S2)
CO3: Develop Python programs using functions and strings.(K3,S2)
CO4: Analyze a problem and use appropriate data structures to solve it.(K4,S3)
CO5: Develop python programs to implement various file operations and exception handling.(K3,S2)

Pre-requisites : Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		S			M					M		M		
CO2			M							M		M		
CO3			M							M		M		M
CO4	S	S	M		M					M		M	M	M
CO5			M							M		M		

COURSE ASSESSMENT METHODS

DIRECT
1.Continuous Assessment Test I, II (Theory component)
2. Open Book Test, Assignment
3.Viva, Experimental Report for each Experiment (lab Component)
4. Model Examination (lab component)
5. End Semester Examination (Theory and lab components)
INDIRECT
1. Course-end survey

THEORY COMPONENT CONTENTS

BASICS OF PYTHON PROGRAMMING 6 Hours

Introduction-Python Interpreter-Interactive and script mode -Values and types, operators, expressions, statements, precedence of operators, Multiple assignments, comments.


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CONTROL STATEMENTS AND FUNCTIONS IN PYTHON 6 Hours

Conditional (if), alternative (if-else), chained conditional (if-elif-else)-Iteration-while, for, break, continue, pass – Functions - Introduction, inbuilt functions, user defined functions, passing parameters, return values, recursion, Lambda functions.

DATA STRUCTURES: STRINGS, LISTS and SETS 7 Hours

Strings-String slices, immutability, string methods and operations -Lists-creating lists, list operations, list methods, mutability, aliasing, cloning lists, list and strings, list and functions-list processing-list comprehension, searching and sorting, Sets-creating sets, set operations.

DATA STRUCTURES: TUPLES, DICTIONARIES 5 Hours

Tuples-Tuple assignment, Operations on Tuples, lists and tuples, Tuple as return value-Dictionaries-operations and methods, Nested Dictionaries.

FILES, MODULES, PACKAGES 6 Hours

Files and Exception-Text files, reading and writing files, format Operator-Modules-Python Modules-Creating own Python Modules-packages, Introduction to exception handling.

Theory: 30	Tutorial: 0	Practical: 0	Project: 0	Total: 30 Hours

REFERENCES

1. Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python" , Mc-Graw Hill Education,2018.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second edition, Updated for Python 3, Shroff / O'Reilly Publishers, 2016.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd," Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
6. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus", Wiley India Edition, 2013.

E BOOKS AND ONLINE LEARNING MATERIALS

1. www.mhhe.com/kamthane/python
2. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, Second edition, Updated for Python 3, Shroff / O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

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LAB COMPONENT CONTENTS **30 Hours**

LIST OF EXPERIMENTS

1. Implement simple python programs using interactive and script mode.
2. Develop python programs using id() and type() functions
3. Implement range() function in python
4. Implement various control statements in python.
5. Develop python programs to perform various string operations like concatenation, slicing, Indexing.
6. Demonstrate string functions using python.
7. Implement user defined functions using python.
8. Develop python programs to perform operations on list
9. Implement dictionary and set in python
10. Develop programs to work with Tuples.
11. Create programs to solve problems using various data structures in python.
12. Implement python program to perform file operations.
13. Implement python programs using modules and packages.

Theory: 0	Tutorial: 0	Practical: 30	Project: 0	Total: 30 Hours

ONLINE COURSES AND VIDEO LECTURES:

http://nptel.ac.in
https://www.edx.org/course/introduction-to-python-fundamentals-1
https://www.edx.org/course/computing-in-python-ii-control-structures-0
https://www.edx.org/course?search_query=Computing+in+Python+III%3A+Data+Structures


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U18TXI2201 **TEXTILE FIBRES**

L	T	P	J	C
2	0	2	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss about the natural fibres.
CO2: Discuss about manufacturing process, properties & applications of regenerated fibers.
CO3: Explain about the manufacturing process, properties & applications of synthetic fibers.
CO4: Summarize about specialty fibers and identification of fibers.
CO5: Outline about the post spinning operations.

Pre-requisite: U18TXT1001- Introduction to Textiles

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S	M												
CO2	S	M											M	
CO3	S	M												
CO4	S	M												
CO5	S	M											M	

Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc (as applicable) 3. End Semester Examination
Indirect
1. Course-end survey


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NATURAL FIBRES

Classification of fibres **6Hours**

Cotton: Types & classification based on staple length, morphological & chemical structure, properties and applications. Jute: Chemical constituents, properties and applications.

Animal fibres:

Wool: Types & grading of wool, morphological &chemical structure, properties and applications.

Silk: Types, chemical structure, properties and applications.

REGENERATED FIBRES **6 Hours**

Basic production systems of man-made fibres: Melt, Dry and wet spinning systems. Viscose rayon: Raw material & manufacturing, properties and applications. Introduction to cellulose acetate, cupprammonium rayon and regenerated protein base fibres.

SYNTHETIC FIBRES **6 Hours**

Raw material, manufacturing, properties and applications of Polyester, Nylon6&Nylon 6, 6, PAN, Poly olefin and Elastomeric fibres.

SPECIALTY FIBRES **6 Hours**

Raw material, properties and applications of para& meta-aramid fibres, Carbon, Glass fibre. Introduction to bicomponent and SAP.

POST SPINNING PROCESS 6 **Hours**

Tow to top conversion, Spin finish, additives used in fibre manufacturing, drawing and Heat setting: Mechanism, changes in properties of fibre, , Texturizing: False twist, air texturizing,

Theory 30 Hours **Total: 30 Hours**

REFERENCES

1. Mishra S.P., A Textbook of fibre science and technology, New Age Int., 2000.

2. Gohl E.P.G. and Vilensky L.D., Textile Science, CBS Pub. And Distributors, New Delhi, 2003.

3. Gupta V.B. and Kothari V.K., Manufactured fibre Technology,Chapman and hall, 1stedition, 1997.

4. Vaidya A.A., Production of synthetic fibres, Prentice Hall of India (P) Ltd., New Delhi, 1988.

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5. Moncrieff R.W., Man made fibres, Butterworths Ltd.,1975.

6.Gordon Cook J., Hand book of Textile fibres, Vol. 1–Natural fibres, CBS Pub. And Distributors, 2005.

7.Gordon Cook J., Hand book of Textile fibres, Vol. 2–Manmade fibres, CBS Pub. And Distributors, 2005.

8.Sreenivasamurthy H.V., Introduction to Textile Fibres, The Textile Association (India) Pub., Mumbai, 1987.

Textile Fibres Laboratory

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Study on maturity assessment through microscopy method

CO2: Study on fibre identification through various methods

CO3: Analyze moisture properties of fibers and blend proportion of fibres

CO4: Analyze the influence of acids, alkalis on conventional fibres

CO5: Study on effect of spin finish chemicals and solvents on conventional fibres

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	M							M	M				
CO2	S	M							M	M			M	
CO3	M	M							M	M				
CO4	M	M							M	M			M	
CO5	M	M							M	M				


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Course Assessment methods

Direct
1. Pre-or Post-experiment Test/Viva; Experimental Report for each experiment; Comprehensive report / Model Examination 2. End Semester Examination
Indirect
1. Course-end survey

List of Experiments **30 Hours**

1. Identification of textile fibres by microscopy method.
2. Studying swelling behavior and maturity measurement by caustic soda method of cotton fibres.
3. Identification of textile fibres by flammability methods.
4. Determination of moisture absorption properties of textile fibres.
5. Identification of textile fibres through solubility test.
6. Determination of blend proportion of given samples.
7. Effect of acid on polymers under various factors (Temperature/ time/Concentration).
8. Effect of alkali on polymers under various factors (Temperature/ time/Concentration).
9. Determination of molecular weight of polymers using viscometry.
10. Study of spin finish in manufactured fibres through soxhlet extraction

Theory: 30Hours	**Tutorial: 0**	**Practical: 30 Hours**	**Project: 0**	**Total: 60 Hours**


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U18MEP2501 ENGINEERING PRACTICES LABORATORY

L	T	P	J	C
0	0	2	0	1

(Common to FT, TXT and AUE)

Course outcomes (COs)

At the end of this course, the student will be able to:

CO1: Understand the applications of simple tools used in the fabrication workshop.

CO2: Select the appropriate tools required for specific operation.

CO3: Make simple joints using Carpentry and Fitting tools also make simple components using sheet metal tools.

CO4: Understand the applications of different plumbing tools and fittings.

CO5: Demonstrate and evaluate the parameters of basic electronic components (wires, resistors, capacitors, diodes etc.) and test the components.

CO6: Estimate DC and AC Voltage and currents using appropriate measuring instruments.

Pre-requisites: Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			W					M		M				
CO2			W					M		M				
CO3			W					M		M				
CO4			W					M		M				
CO5			W					M		M				
CO6			W					M		M				

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II (Theory component)
2. Open Book Test, Assignment, Group Presentation
3. Viva, Experimental Report for each Experiment (lab Component)
4. Model Examination (lab component)
5. End Semester Examination (Theory and lab components)

INDIRECT

1. Course-end survey


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LIST OF EXPERIMENTS

GROUP – I

A. CIVIL ENGINEERING

1. Carpentry
   - Study of carpentry tools
   - Preparation of T joint
   - Preparation of dovetail joint
2. Plumbing
   - Study of pipeline joints

B. MECHANICAL ENGINEERING

1. Fitting
   - Study of fitting tools
   - Preparation of L joint
2. Sheet Metal Working
   - Study of sheet metal working tools
   - Preparation of Tray
   - Preparation of Cone
3. Demonstration of mold preparation
4. Demonstration of smithy operations
5. Demonstration of SMA welding process

GROUP - II (ELECTRICAL & ELECTRONICS ENGINEERING)

C. ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair-case wiring.
4. Measurement of electrical quantities–voltage, current, power & Power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.

D. ELECTRONIC ENGINEERING PRACTICE

1. Assembling simple electronic component on a small PCB and Testing.
2. Soldering simple electronic circuits and checking continuity.
3. Measurements using digital multimeter.
   - DC and AC voltage measurement
   - DC and AC current measurements.
   - Resistance Measurement.
   - Continuity measurement.

1. Testing of Electronic components
   - Resistors
   - Inductors and capacitors
   - Diodes (resistance in forward bias and reverse bias)
   - Transistors


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2. Study of CRO and Function generator

- Study of Panel Controls
- Measurement of Amplitude, Frequency, phase difference

Theory: 0	Tutorial: 0	Practical: 30	Project: 0	Total: 30 Hours


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U18INI2600 **ENGINEERING CLINIC - II**

L	T	P	J	C
0	0	4	2	3

Course objectives

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

Course Outcomes (COs)

After successful completion of this course, the students should be able to:

CO1: Identify a practical problems and find a solution.
CO2: Understand the project management techniques.
CO3: Demonstrate their technical report writing and presentation skills.

Pre-requisite: U18INI1600 Engineering Clinic -I

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S	S	S	S	M	W		S			S		
CO2											S			
CO3										S				

Course Assessment methods:

Direct	Indirect
1.Project reviews 50% 2.Workbook report 10% 3.Demonstration & Viva-voce 40%	1. Course Exit Survey

Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start


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with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the second semester, students will focus primarily on Raspberry pi based controllers with Python programming.

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

Total Hours: 90


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SEMESTER- III


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U18MAT3103	PROBABILITY AND STATISTICS	L	T	P	J	C
	(Common to TXT/BT)	3	1	0	0	4

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Compute measures of central tendencies, dispersion and correlation between variables, and predict unknown values using regression.

CO2: Understand and apply the concept of probability and random variables.

CO3: Construct probabilistic models for observed phenomena through distributions, which play an important role in many engineering applications.

CO4: Perform hypothesis testing and interpret the results.

CO5: Understand the principles of design of experiments and perform analysis of variance.

CO6: Sketch control charts and comment on the process control.

Pre-requisites : Nil

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S							M	M		M	M	
CO2	S	S							M	M		M	M	
CO3	S	S							M	M		M	M	
CO4	S	S							M	M		M	M	
CO5	S	S							M	M		M	M	
CO6	S	S							M	M		M	M	

Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable) 3. End Semester Examination
Indirect
1. Course-end survey

STATISTICAL MEASURES **9 +3 Hours**

Measures of central tendency: Arithmetic Mean, Median and Mode – Measures of variation: Range, Mean deviation, Standard deviation and Coefficient of variation – Correlation (Discrete Data): Karl Pearson's Correlation coefficient, Spearman's Rank Correlation – Regression lines (Discrete Data).

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PROBABILITY AND RANDOM VARIABLES **9+3 Hours**

Axioms of probability - Conditional probability – Total probability – Bayes' theorem - Random variable – Distribution function – properties – Probability mass function – Probability density function – Moments - Moment Generating functions.

STANDARD DISTRIBUTIONS **9+3 Hours**

Binomial, Poisson and Normal distributions – Moments, Moment Generating functions and properties for the above distributions - Fitting of Binomial and Poisson distributions

9+3 Hours

TESTING OF HYPOTHESIS

Testing of hypothesis for large samples (single mean, difference of means, single proportion, difference of proportions) – Small samples tests based on t and F distributions (single mean, difference of means, paired *t*- test and variance ratio test) – Chi-square test for independenceof attributes and goodness of fit

DESIGN OF EXPERIMENTS **5 +2 Hours**

Analysis of Variance (ANOVA) – Completely Randomized Design (CRD) – Randomized Block Design (RBD) – Latin Square Design (LSD).

STATISTICAL QUALITY CONTROL **4 +1 Hours**

Concept of process control - Control charts for variables: Mean and Range charts – Control charts for attributes: p, np, c – charts.

Theory: 45 Tutorial: 15 Practical: 0 Project: 0 Total: 60 Hours

REFERENCES

1. Veerarajan T., Probability, Statistics and Random Processes, Tata McGraw Hill, 3rd edition, 2008.
2. Gupta S. P, Statistical Methods, Sultan Chand & Sons Publishers, 2014.
3. Johnson R. A., Miller & Freund's "Probability and Statistics for Engineers", Sixth Edition, Pearson Education, Delhi, 2000.
4. Gupta.S.C and Kapoor V.K, Fundamentals of Mathematical Statistics, 11th extensively revised edition, Sultan Chand & Sons, 2007.
5. Walpole R. E., Myers S.L. & Keying Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education Inc, 9th edition, 2012.
6. Gupta S.C and Kapur V.K, Fundamentals of Applied Statistics, Sultan Chand, New Delhi, 4th Edition, 2014.
7. Charles Henry Brase and Corrinne Pellillo Brase "Understandable Statistics", D.C. Heath and Company, Toronto, 9th edition, 2007.

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U18EII3203 **MEASUREMENTS AND INSTRUMENTATION**

L	T	P	J	C
3	0	2	0	4

Course Outcomes (COs):

After Successful completion of this course, the students will be able to :

CO1: Understand the parameters used for measurement in textile industry

CO2: Identify the various transducers used for various applications.

CO3: Understand about how the feature extraction using mage analysis in textile processing

CO4: Apply the criteria to choose appropriate sensors for specific applications

CO5: Utilize and apply the control components for textile processing applications

Pre-requisite: NIL

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M													
CO2	S						S					S		
CO3					M									S
CO4			M											
CO5					W							M	S	

Course Assessment Methods:

Direct	Indirect
• Model Lab Exam • End Semester Practical Exam	• Course Exit Survey

TEXTILE MEASUREMENT PARAMETERS **5Hours**

Introduction to textile measurement parameters, Units and standards of displacement, force, pressure, temperature, pH concentration, strain, Flow

SENSOR TYPES **12Hours**

Introduction to Instrumentation, Sensors, classification of transducers according to the parameters: Pressure Detectors- Bellows and Bourdon type detectors, Resistance type transducers, Strain Gauge Transducers, Inductive type transducers, Differential Transformers,

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Capacitive type transducers, and Pressure detector functions Displacement Transducers, angular and linear, Level Detectors, Flow detectors, Temperature Sensors pH Concentration measurement Schemes for measurement with transducers ,measurement of thickness and humidity, temperature measurement using resistance thermometer, thermocouple and thermistor.

CONCEPT OF IMAGE PROCESSING: 4 Hours

Elements of Digital Image Processing Image formation and measures. Pre-processing techniques, image transforms - enhancement - restoration – encoding. – Application of image processing to textile process/product feature extraction.

SENSOR SELECTION CRITERIA 6 Hours

How to Select the Sensors, Interpretation of Sensor specifications, Datasheet, Static characteristics: error, accuracy, precision, resolution, Hysteresis, modelling and error reduction.

MEASUREMENT ACCESSORIES AND GENERAL TEST EQUIPMENTS: 5 Hours

Brief concept of instrumentation amplifiers, signal generation and processing, data acquisition and conversion, input –output devices and displays.Brief review of general purposeelectronic test equipments- CRO, Digital Multimeter, counters, signal generators, regulated power supplies. Digital recording techniques

CONTROL SYSTEM COMPONENTS: 13 Hours

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 - material handling system. Data acquisition system for spinning preparatory, ring spinning - rotor spinning.

REFERENCES

1.Rangan C S, Sharma G R, Mani V S, 'Instrumentation Devices and Systems', Tata McGraw Hill, New Delhi,2001

2. Alan S Morris, Measurement and Instrumentation Principles 4th edition

3. L. Ashok Kumar, M Senthilkumar, "Automation in Textile Machinery: Instrumentation and Control System Design Principles" CRC Press , 2018

4. Berk stresser G A. Grady P and Buchanan.D R, "Automation in the Textile Industry from Fibres to Apparel", the Textile Institute, Manchester, 1995.

List of Experiments: 30 hours

1 Characteristics of temperature sensors (thermocouple/ thermistor)

2 Measurement of Displacement using LVDT

3 Measurement of strain using strain gauge Bridges

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4	Measurement of displacement using capacitive transducer
5	Measurement of flow using orifice meter
6	Measurement of Ph
7	Simple design of an amplifier using instrumentation amplifier
8	Design a simple counter for textile industry application
9	Identification of transfer function for a simple mechanical system used in textile industry
10	Simple ladder logic programming using PLC

Theory: 45Hours **Practical: 30 Hours** **Total: 75 Hours**


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L	T	P	J	C
3	0	0	0	3

U18TXT3001

PHYSICAL PROPERTIES OF TEXTILE FIBRES

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Outline the fundamentals of fibre structures and various properties of polymer system.

CO2: Interpret the relationship between various parameters and the moisture properties of fibres.

CO3: Explain about the concepts of mechanical properties of fibres.

CO4: Describe the optical and frictional parameters related with fibre properties.

CO5: Discuss about the fundamentals and measurement of electrical and thermal properties of fibre.

Pre-requisite: NIL

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S												S	
CO2		M											M	
CO3		M											M	
CO4				M										
CO5		S											S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

STRUCTURE OF FIBRES **9 Hours**

Basic requirements for fiber formation: Intra- and inter-molecular forces, degree of order, degree of orientation of molecular chains, crystalline and amorphous regions – Influence of molecular structure on crystallization. Models of fibre structure. Similarities and differences amongst the structural features of natural and man-made fibres. Analysis of charts from X-ray diffraction methods.

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MOISTURE ABSORPTION PROPERTIES OF FIBRES **9 Hours**

Absolute humidity and relative humidity- moisture content and regain of different fibres- Moisture regains curves, Hygroscopic nature of fibres. Hysteresis in moisture absorption. Equilibrium absorption - Effect of fibre structure – hydrophilic groups and non-crystalline regions on Moisture absorption. Conditioning of fibers –Conditioning process, factors influencing rate of conditioning, effect of conditioning on fibre properties.

MECHANICAL PROPERTIES OF FIBRES **9 Hours**

Definitions –Load elongation, breaking strength, breaking extension, tensile Stress, tensile strain, mass specific stress, yield point, initial modulus, work of rupture and work factor. Stress-strain curves for various textile fibres and their significance. Mechanical development of large strain. Elastic properties – elasticity, elastic recovery and its relation to stress and strain, work recovery, typical values of elastic recovery and work recovery for various textile fibres. Ways of studying relaxation phenomenon. Mechanical conditioning of fibres – advantages. Time effects – stress relaxation and creep phenomena. Torsional rigidity – its relation to other fibre properties, measurement techniques. Flexural rigidity – its relation to other fibre properties, measurement techniques.

OPTICAL AND FRICTIONAL PROPERTIES **9 Hours**

Refractive index of fibres Birefringence – measurement techniques, effect of factors like fibre orientation, density and regain. Optical orientation factor, its relation with refractive index and birefringence. Reflection of light – specular and diffused reflection, lustre, lustre index, factors influencing lustre. Absorption of light – dichroism, dichroic ratio. Theories of fibre friction- Amonton's law; Measurement: Bowden' s model, Capstan methods; Lindberg's inter fibre friction Yarn to yarn abrasion and friction; friction of wool.

ELECTRICAL AND THERMAL PROPERTIES **9 Hours**

Static electricity – generation of static charge and measurement, problems encountered during Processing, elimination techniques. Electrical resistance of fibres, measurement of resistance in fibres, factors influencing electrical resistance. Dielectric properties, factors influencing di-electricity. Thermal properties – specific heat, thermal conductivity, thermal expansion and contraction, structural changes in fibres on heating, heat setting of various synthetic fibres.

Theory 45 Hours	**Total: 45 Hours**

REFERENCES

1. Morton W.E and Hearle., J.W.S., "Physical Properties of Textile Fibres", The Textile Institute, Manchester, U.K., 4th Edition,2008.

2. Meredith. R and Hearle, J.W.S., "Physical Methods of Investigation of Textiles", Wiley Publication, New York, 1989.

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3. Gupta V.B., “Textile Fibres: Developments and Innovations”, Vol. 2, “Progress in Textiles: Science & Technology”. Edited by V.K. Kothari, IAFL Publications, 2000.

4. Meredith R.., “Mechanical Properties of Textile Fibres”, North Holland, Amsterdam 1986.

5. Gohl E.P.G. and Vilensky L.D., “Textile Science”, second edition, CBS Publisher and Distributor, 1983.

6. Mishra, S.P., Fibre Science & Technology, New Age International Publishers, 2000.

7. Gupta V.B. and Kothari V.K., “Manufactured Fibre Technology”, Chapman and Hall, 1997.

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U18TXI3202 YARN MANUFACTURING TECHNOLOGY – I

L	T	P	J	C
3	0	2	0	4

Course Outcomes (COs)

After successful completion of this course, the students should be able to
CO 1: Discuss the concepts and mechanism of opening and cleaning of blow room machines.
CO 2: Explain the principle and mechanism of fibre individualization in carding.
CO 3: Describe the concept of fibre parallelization in draw frame.
CO 4: Discuss the concept & mechanism in comber process.
CO 5: Explain the principle and working of speed frame.

Pre-requisite: NIL

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S												S	
CO2			S											
CO3				S										
CO4					S									
CO5				S										

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey


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GINNING AND BLOW ROOM **15 Hours**

Theory

Study of different types of gins –Effect of ginning performance on yarn quality. Objectives of blow room –UNI Blending Machine-Types of beaters in Blow room, degree of blending- IBI, Opening of machine for coarse, fine & super fine fibre, Concepts of opening intensity and cleaning efficiency. Contamination sorters, Chute feed system. Automatic Waste Evacuation System (AWES). Use of air current, modern developments in blow room

Practical

1. Determination of speed & settings in ginning machine.

2. Determination of speeds of beaters in mono cylinder and ERM cleaner, bale opener.

CARDING **15 Hours**

Theory

Objectives – passage of material of modern card, carding disposition and doffing disposition; Salient features of new generation cards -Integrated Draw frame. Selection of card clothing for cotton& synthetics blends. Draft distribution, Auto levellers-Waste levels in card for various materials. Principle, settings & production calculation.

Practical

1. Analysis of Working mechanism and calculation of draft distribution & production calculation in carding machine.

2.Setting between various zones of carding machine & to find out the nep content in the web

DRAWFRAME **15 Hours**

Theory

Objectives - Principle of doubling and drafting. Drafting system - draft theory - drafting wave - actual and perfect draft. Cots – Types &Specification. Rollers slip & rollers eccentricity. Auto levellers-Principle, modern developments in Draw frame and production calculation.

Practical

1.Determination of speed, draft distribution


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2. Roller setting in draw frame.

COMBING **15 Hours**

Theory

Objectives of Comber-comber preparatory, working of combing machine -Circular comb and Top comb; Types of feed; combing settings and their importance, timing diagram, cycle of combing. Production calculation and fractionating efficiency for a comber, Modern developments in comber -Automatic piecing and lap transport system.

Practical

1. Determination of speed, draft, production & combing cycle of comber.

2. Estimation of head-to-head variation in noil level.

SPEED FRAME **15 Hours**

Theory

Objectives - Principle and working, winding principles in fly frame, Bobbin lead & flyer lead winding, Mechanism of winding and bobbin building. Draft, twist and production calculations, Modern developments in speed frame -Bobbin transport system.

Practical

1. Determination of speed, draft distribution, twist & production calculation in speed frame.

2. Determination of bobbin speed at various belt positions on cone drums & plot the graph

Theory: 45 Hours	**Practical:30Hours**	**Total: 75 Hours**

REFERENCES

1.Chattopadhyay R., Technology of Carding, NCUTE, IIT Delhi, 2003.
2.Chattopadhyay R. (Ed), Advances in Technology of Yarn Production, NCUTE, IIT Delhi, 2002
3.Oxtoby E "Spun Yarn Technology" butter worth's, London, New Edition 2002.
4.Salhotra K. R. &Chattopadhyay R., Book of papers on "Blow room and Carding" ,IIT Delhi 1998.


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5.Duraiswamy I, Chellamani P &Pavendhan A., “Cotton Ginning” Textile Progress, The Textile Institute, Manchester, U.K., 1993.
6.Lord P. R., Yarn Production: Science, Technology and Economics”, The Textile Institute, Manchester, U.K., 1999.
7.Arkady Cherakassky, Two dimensional mathematical model of the carding process, Textile research journal P. 169 – 175, March 1994.


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U18TXT3003 FABRIC MANUFACTURE I

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Summarize the requirements of preparatory machines for producing woven fabric with required qualities.

CO2: Explain the concept and mechanism of preparatory processes.

CO3: Describe the functioning of various motions and it's timing in shuttle weaving machine.

CO4: Explain the concept and mechanism of various motions of shuttle weaving machine.

CO5: Select and control the process variables of various motion at loom.

Pre- requisite: NIL

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M												M	
CO2		S												M
CO3	M												M	
CO4		S												M
CO5				S									M	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Presentation 4. End Semester Examination	1. Course end survey

WINDING **9 Hours**

Objectives of winding, Geometry of cone winding, Classification of yarn faults and its identification. Electronics yarn clearer. Knotters and Splicers. Classification of winders. Working principles of automatic cone winders, Pirn winder, Pirn bunching. Production calculations of cone and Pirn winders.

WARPING AND SIZING **9 Hours**

Types of creels; working principles of beam and sectional warpers; Objectives of sizing - Working principles of multi cylinder, single end sizing machines and combined dyeing and sizing. Size ingredients, Size preparation. Production calculation in warping and sizing.

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WEAVING **9 Hours**

Drawing-in and gaiting operations; types of weaving motions - primary, secondary and auxiliary motions; classification of looms; loom timing diagram for different motions; weaving accessories.

PRIMARY MOTIONS **9 Hours**

Shed geometry and shedding requirement; types of shed; shedding mechanisms - principles of tappet, dobby and jacquard shedding mechanisms; reversing mechanisms; Shuttle picking and checking mechanisms; beat up mechanism in shuttle looms.

SECONDARY AND TERTIARY MOTIONS **9 Hours**

Take-up and let-off motion used in power loom; Warp protector mechanism and Warp and weft stop motion; Weft feelers and weft replenishment mechanism; Multiple box motions; Terry mechanism.

Total: 45 Hours

REFERENCES

1. Lord P.R. and Mohammed M.H., "Weaving – Conversion of Yarn to Fabric", Merrow Publication, 2001.
2. Adanur S., "Handbook of Weaving", Woodhead Publishing Limited, 2001.
3. Sriramlu P.K., Ajgaonkar D.B. &Talukdar M.K., "Weaving Machines: Mechanisms, Management", Mahajan Publishers, Ahmedabad, 1998.
4. Modi J.R.D., "Sizing Ingredients", Mahajan Publications, Ahmedabad
5. Booth J.E., "Textile Mathematics", Vol. II & III, Textile Institute, Manchester,U.K., 1975.
6. Sengupta E., "Yarn Preparation", Vol. I & II, Popular Prakasam, Bombay, 1970.
7. "Woven fabric production – I", Quality CBT & course material from NCUTE, 2002.
8. "Woven fabric production – II", Quality CBT & course material from NCUTE, 2002.

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U18TXP 3504 FABRIC MANUFACTURE I LAB

L	T	P	J	C
0	0	2	0	1

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Operate the winding machine by altering the process variables.

CO2: Carryout the hands-on-training of various mechanisms involved in woven fabric manufacturing.

CO3: Alter the settings of various mechanisms involved in weaving preparatory and weaving machines.

CO4: Assemble the dismantled parts of the mechanisms in weaving machine.

CO5: Specify the importance of each part in weaving preparatory and weaving machines.

Pre-requisite: NIL

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M			S										
CO2				S	M									S
CO3				M										S
CO4			M										M	
CO5		M											M	

Course Assessment methods

Direct	Indirect
1. Observation 2. Lab Exercises 3. Model Practical Examination 4. End Semester Practical Examination	1. Course end survey

List of Experiments

1. Determination of package density, winding angle, wind and traverse ratio in automatic cone winders and calculate the production in kgs per shift of 8 hours.
2. Study the mechanisms for regulating pirn dimensions and characteristics in automatic pirn winder.
3. Preparation of single end sizing of given yarn and determination of size pick-up % and tensile properties.
4. Determination of depth of shed, heald shaft movements and reversing motion in tappet shedding.

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5. Study of jacquard shedding mechanism in shuttle loom.
6. Study of dobby shedding mechanism and preparation of pattern card for new design.
7. Study of picking mechanisms and calculate the shuttle velocity with changing the settings.
8. Study of let-off motion and back rest.
9. Study of seven-wheel take-up motion and dividend calculation.
10. Study of warp and weft stop motions.
11. Study of warp protector mechanisms and setting of parts during normal and shuttle trap.
12. Study of automatic pirn changing mechanism and weft feeler mechanism.

Practical: 30 Hours	**Total: 30 Hours**


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U18INI3600 ENGINEERING CLINIC - III

L	T	P	J	C
0	0	4	2	3

Course objectives

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

Course Outcomes (COs)

After successful completion of this course, the students should be able to:

CO1: Identify a practical problems and find a solution.
CO2: Understand the project management techniques.
CO3: Demonstrate their technical report writing and presentation skills.

Pre-requisite: U18INI2600 Engineering Clinic -II

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S	S	S	S	M	W		S			S		
CO2											S			
CO3										S				

Course Assessment methods:

Direct	Indirect
1.Project reviews 50% 2.Workbook report 10% 3.Demonstration & Viva-voce 40%	1. Course Exit Survey

Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start


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with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the third semester, students will focus primarily on design project combining concepts learnt in Engineering clinics I and II.

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

Total Hours: 90


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U18CHT3000 **ENVIRONMENTAL SCIENCE AND ENGINEERING (COMMON TO ALL BRANCHES)**

L	T	P	J	C
3	0	0	0	0

Course Outcomes (COs)

After successful completion of this course, the students would be able to

CO 1: Analyze the impact of engineering solutions in a global and societal context.

CO 2: Discuss contemporary issues that results in environmental degradation and would attempt to provide solutions to overcome those problems.

CO 3: Highlight the importance of ecosystem and biodiversity.

CO 4: Consider issues of environment and sustainable development in his/her personal and professional undertakings.

CO 5: Paraphrase the importance of conservation of resources.

CO 6: Play an important role in transferring a healthy environment for future generations.

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1		M					S		M			
CO 2						M				M		
CO 3							M					
CO 4						M	S					
CO 5							S					
CO 6			W				S					M

Course Assessment methods

Direct	Indirect
1. Internal Test I 2. Internal Test II 3. Assignment 4. Group presentation	Course end survey

INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES **14 Hours**

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies – Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and overutilization of surface and ground water, conflicts over water, dams – benefits and problems – Water conservation, rain water harvesting, watershed management.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, case studies.

Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources, case studies.

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Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification, Wasteland reclamation – Role of an individual in conservation of natural resources.

ECOSYSTEMS AND BIODIVERSITY **9 Hours**

ECOSYSTEM:

Concept of an ecosystem – Structure and function of an ecosystem: Producers, consumers and decomposers, Food chain, Food web, Energy flow in the ecosystem and Ecological pyramids – Ecological succession – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

BIODIVERSITY: Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity – Bio geographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic values – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

ENVIRONMENTAL POLLUTION **8 Hours**

Definition – Causes, effects and control measures of: (a) Air pollution – Organic and inorganic pollution – cyclone separator, electrostatic precipitator (b) Water pollution (c) Heavy metal pollution (d) Noise pollution (e) Thermal pollution (f) Nuclear hazards – Role of an individual in prevention of pollution – Pollution case studies – Solid waste and hazardous Management: Causes, effects and control measures from factories, small scale and large scale industries – Waste minimization – Disaster management: floods, earthquake, cyclone and landslides.

SOCIAL ISSUES AND THE ENVIRONMENT **7 Hours**

From Unsustainable to Sustainable development – Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns, case studies – Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Human Rights.

HUMAN POPULATION AND THE ENVIRONMENT **7 Hours**

Population growth and explosion – Welfare Program – Environment and human health – Communicable disease – Role of Information Technology in Environment and human health – Case studies.

Theory: 45 Hours	**Total: 45 Hours**

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REFERENCES

1. G. Tyler Miller and Scott Spoolman, 'Environmental Science', Fourteenth Edition, Brooks Cole, 2012.

2. Gilbert M. Masters and Wendell P. Ela, 'Introduction to Environmental Engineering and Science', Third Edition, Pearson Education, 2013.

3. Bharucha Erach, 'The Biodiversity of India', Mapin Publishing Pvt. Ltd., Ahmedabad, 2002.

4. Trivedi R.K and P.K.Goel, 'Introduction to Air Pollution', Techno-Science Publications, 2003.

5. Trivedi R.K., 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media, 1996.

6. Cunningham, W.P.Cooper and T.H.Gorhani, 'Environmental Encyclopedia', Jaico Publication House, Mumbai, 2001.

7. Wager K.D., 'Environmental Management', W.B. Saunders Co., Philadelphia, USA, 1998.

8. Colin R. Townsend, Michael Begon and John L. Harper, 'Essentials of Ecology', Third Edition, Blackwell Publishing, 2008.

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1. FAMILY VALUES IN A HISTORICAL PERSPECTIVE - The Tanner Lectures on www.tannerlectures.utah.edu/_documents/a-to-z/s/Stone95.pdf

2. PROBLEMS OF INDIA'S CHANGING FAMILY AND STATE ... - the United Nations - www.un.org/esa/socdev/family/docs/egm09/Singh.pdf

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SEMESTER- IV


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U18MAT4102 **NUMERICAL METHODS**
(Common to FT/BT/TXT)

L	T	P	J	C
3	1	0	0	4

Course outcomes (COs)

After successful completion of the course, the student would be able to:

CO1: Solve a set of algebraic equations representing steady state models formed in engineering problems.

CO2: Fit smooth curves for the discrete data connected to each other or to use interpolation methods over these data tables.

CO3: Find the trend information from discrete data set through numerical differentiation.

CO4: Estimate integrals from discrete data through numerical methods.

CO5: Predict the system dynamic behaviour through solution of ODEs modeling the system.

CO6: Solve PDE models representing spatial and temporal variations in physical systems through numerical methods.

Pre-requisite: NIL

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S										M	M	
CO2	S	S										M	M	
CO3	S	S										M	M	
CO4	S	S										M	M	
CO5	S	S										M	M	
CO6	S	S										M	M	

Course Assessment methods:

Direct
1. Continuous Assessment Test I, II 2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable) 3. End Semester Examination
Indirect
1. Course-end survey

NUMERICAL SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS **9+3 Hours**

Solution of nonlinear equations - False position method – Fixed point iteration – Newton Raphson method for a nonlinear equation and a system of equations - Solution of linear system of equations by Gaussian elimination, Gauss Jordan method, Gauss Jacobi method ,Gauss Seidel method - Matrix Inversion by Gauss Jordan method – Largest eigenvalue of a matrix by Power method.


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CURVE FITTING AND INTERPOLATION **9+3 Hours**

Curve fitting – Method of least squares - Newton's forward and backward difference interpolation – Divided differences – Newton's divided difference interpolation - Lagrange's interpolation – Inverse interpolation.

NUMERICAL DIFFERENTIATION AND INTEGRATION **9+3 Hours**

Numerical differentiation by using Newton's forward, backward and divided differences – Numerical integration by Trapezoidal and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Numerical double integration.

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3 Hours

Initial value problems - Single step methods: Taylor's series method – Truncation error – Euler and Improved Euler methods – Fourth order Runge – Kutta method – Multistep method: Milne's predictor - corrector method.

NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS **9+3 Hours**

Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain–Solution of one dimensional heat equation using Bender Schmidt and Crank Nicholson difference schemes –Solution of one dimensional wave equation by explicit scheme.

Theory : 45Hours	**Tutorial :15 Hours**	**Total: 60Hours**

REFERENCES:

1. Kandasamy P., Thilagavathy K. and Gunavathy K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2007.
1. Steven C. Chapra and Raymond P. Canale, "Numerical Methods for Engineers with Programming and Software Applications", McGraw-Hill, 2004.
3. John H. Mathews and Kurtis D. Fink, "Numerical Methods using Matlab", Prentice Hall of India, 2004.
4. Gerald C. F. and Wheatley P.O, "Applied Numerical Analysis",Pearson Education Asia, New Delhi, 2002.
5. Sastry S.S, "Introductory Methods of Numerical Analysis", PrenticeHall of India Pvt Ltd, New Delhi, 2003.

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U18MET4007 BASICS OF MECHANICAL ENGINEERING

L	T	P	J	C
3	0	0	0	3

(Common to TXT and FT)

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1 Explain principles of thermodynamics, renewable energy and power plants
CO2 Explain the working principle and combustion characteristics of IC Engines.
CO3 Explain the working principle of VCR & VAR systems.
CO4 Understand and explain the various manufacturing processes and power transmission
CO5 Demonstrate basic manufacturing process
CO6 Explain various types of power transmission

Pre Requisite : Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	S													
CO2		M												
CO3		M												
CO4	W													
CO5	M													
CO6	M													

Course Assessment Methods

Direct	Indirect
1. Internal tests 2. Assignment 3. Group Presentation 4. End Semester Exam	1.Course Exit Survey

LAWS OF THERMODYNAMICS **9 Hours**

First law of thermodynamics – statement and application, steady flow of energy equation, Second law of thermodynamics. Heating and Expansion of Gases, Expression for work done, internal energy, hyperbolic and polytropic processes. Properties of Steam, Dryness fraction, latent heat, total heat of wet steam.

POWER PLANTS **9 Hours**

Classification of Power Plants, Steam, Diesel, nuclear and Hydro Power Plants. Types of turbines, working of a single stage impulse and reaction turbine.

Alternate Sources of Energy: (Solar, Wind, Tidal, Geothermal, Ocean Thermal Energy Conversion (OTEC).Wind/ Solar grid fed power plant, Solar /Water air heaters – Techno-economics of power plants and energy sources.


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INTERNAL COMBUSTION ENGINES **9 Hours**

Classification of IC engines, Main components of IC engines, working of a 4 stroke and 2 stroke petrol and diesel engine, differences between 4 stroke and 2 stroke engine.

Refrigeration and Air Conditioning: principle of vapour compression and vapour absorption refrigeration systems. Air conditioning, terminology and classifications. Humidification and Air conditioning.

MANUFACTURING PROCESSES **9 Hours**

Basic principles of Arc and Gas Welding, Soldering and Brazing, Extrusion, Forging, Rolling, and Drawing Processes. Milling – Types, Operations and Equipment's.

POWER TRANSMISSION **9 Hours**

Types of drives, belt drives – flat and V belts, rope drives, chain drive, gear drives – spur, helical, bevel and worm gears (Descriptive treatment only) – gear trains, simple and compound.

Theory : 45 Hours	**Total: 45 Hours**

REFERENCES

1. Shanmugam G, Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Company, New Delhi, 2nd Edition, 2000.
2. Venugopal.K. and Prabu Raja, "Basic Mechanical Engineering", Anuradha Publications, Chennai, 2007.
3. Sarkar B. K.,"Thermal Engineering" Tata McGraw Hill Company, New Delhi. 2000
4. Rao N., "Manufacturing Technology: Foundry, Forming and Welding", Tata McGraw Hill Co., New Delhi, Paperback Edition. 1998 James Brown, "Advanced Machining Technology Handbook", McGraw Hill, New York,1998

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U18TXT4001 **YARN MANUFACTURING TECHNOLOGY II**

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Explain the basic principles of different spinning system.
CO2: Compare the basic principle of different spinning system.
CO3: Plan the outline spinning system based on end use applications.
CO4: Calculate the production as well as draft of all the spinning systems.
CO5: Modern development in all spinning system.

Pre-requisite:

U18TXI3202 Yarn Manufacturing Technology I

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S												S	
CO2			S											
CO3					S									
CO4				S										
CO5														

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

RING FRAME **9 Hours**

Principle and operation- drafting system, Creels, Types of flutes, separators, builder motion Profile of ring & traveler - Speed, settings, break draft, main draft. Top roller cots & aprons specifications - Ideal yarn geometry, Balloon mechanism, Traveler- lag, Production Calculation. Modern developments in ring frame-Auto doffer-Ecorised-Link Coner-Pin bar spacer-working concept of longer length ring frame.


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COMPACT SPINNING **9 Hours**

Introduction - spinning triangle- working principles of different compact spinning Systems-Eli twist- Comfort win, structure and properties of compact yarns, applications of compact yarn - Techno economics of compact spinning.

ROTOR SPINNING **9 Hours**

Rotor Spinning - Operating principle, Advantages and limitations of Rotor Spinning. Raw material requirements. Machine design features- opening roller, rotor diameter, rotor speed, groove design, profile of doffing tube. Yarn characteristics, Comparison of characteristics of yarn from different spinning systems. Fully automatic and semi-automatic.

OTHER SPINNING SYSTEMS **9 Hours**

Friction Spinning - Operating principle, Classification, Advantages and limitations of friction spinning. Air-jet spinning - operating principle, Raw material requirements-Automation in air jet spinning- Advantages and limitations. Cover Spinning - Operating principle - air vortex spinning.

DOUBLING AND FANCY YARN PRODUCTION **9 Hours**

Ring doubling machine – Working, up twister and down twister. Working of Two For One twister, principles of various fancy yarn producing methods. SIRO Spinning, Bob Tex spinning, self-twist spinning: Yarn properties and applications, Advantages and limitations of these spinning systems.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. Gowda R.V.M., “New Spinning Systems”, NCUTE, IIT Delhi, 2003.
2. Ishtiaque, S.M., Salhotra K.R. and Gowda R.V.M., "Friction Spinning", Textile Progress, Vol. 33, No.2, Textile Institute, U.K., 2001
3. Chattopadhyay R. (Ed)., “Advances in Technology of Yarn Production”, NCUTE, IIT Delhi, 2002.
4. Lawrence C.A. and Chen K.Z., “Rotor Spinning”, Textile Progress, Vol. 13, No.4, Textile Institute, U.K., 1981.
5. Basu A., "Progress in Air-jet Spinning", Textile Progress, Vol. 29, No.3, Textile Institute, U.K., 1997.
6. Oxtoby E., “Spun Yarn Technology” Butterworths, London 1983.
7. W.Klein, “New spinning systems”, The Textile Institute Manchester, U.K. 1993.

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U18TXI4202 FABRIC MANUFACTURE -II

L	T	P	J	C
3	0	2	0	4

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss the concept of shuttle less loom and its evaluation
CO2: Discuss the concept and mechanism of shuttleless weaving machine
CO3: Discover the nonwoven technology
CO4: Describe the various nonwoven web laying and web bonding systems

Pre-requisites:
U18TXT3003 Fabric Manufacture I

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S												M	
CO2		S											M	
CO3		S												S
CO4		S												S

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

SHUTTLELESS WEAVING AND NONWOVEN **9 Hours**

Limitation of shuttle looms- Classification of shuttleless loom- Weft accumulator – types- Formation of unconventional selvedges – tuck-in, leno, chain, fused and adhesive. Nonwovens: Introduction, Definition as per INDA and EDANA, Fibres used in nonwovens. Classification of web laying and web bonding systems-Comparison of woven, knitted and nonwoven.

PROJECTILE AND RAPIER LOOMS **9 Hours**

Gripper projectile machines: Working elements and weft insertion cycle in projectile loom-Torsion bar picking mechanism-Weft selection device-Salient features of projectile machine, Loom timing diagram. Weft insertion rate and production calculation. Classification of rapier weaving machines: Flexible, Rigid rapiers- Principles of tip and loop transfer- Rapier drives -Salient features.


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FLUID JET AND MULTIPHASE LOOMS **9 Hours**

Air jet weaving Machine - Principle of air jet weaving, types of nozzles, profile reed. Air requirements. Principle of water jet weaving – Weft insertion system – Nozzles - Water requirements –Weft insertion rate and production calculation. Multiphase weaving machine – Warp and weft direction shed wave principle. Principle and operation of circular weaving machines

WEB FORMATION SYSTEMS **9 Hours**

Dry laid web Formation: Raw material - Fibre Opening – Carding – Cross lapping - perpendicular-laid web formation - Airlaid web formation: Air laying technology - bonding systems - properties & applications. Wet-laid web formation: theoretical basis of wet forming – raw materials – fibre preparation – web forming technology – bonding systems –properties & applications. Polymer laid web formation: Spun bonding and Melt blown process: raw material - production technology – operating variables – bonding techniques – structure and properties – application.

WEB BONDING SYSTEMS **9 Hours**

Mechanical Bonding: Stitch bonding, Needle Punching: Needle design and selection – various factors influencing needle punching process – needle punching technology – properties and applications – Hydroentanglement: Principle – fibre selection – process technology – properties and applications. Thermal Bonding: principle – raw materials – technologies such as calender bonding, thorough air bonding, ultrasonic & IR bonding – structure and properties – applications. Chemical Bonding: Chemical binders – mechanism of chemical bonding – methods of binder application – drying – Limitations and applications.

Theory:45 Hours	**Total : 45 Hours**

REFERENCES:

1. Sabit Adanur, “Hand book of weaving”, CRC Press Co. ISBN No. 1-58716-013-7, 2001.
2. Prabir Kumar Banerjee., “Principles of Fabric Formation”, CRC Press, 2014.
3. Talukdar M K, Sriramulu P K and Ajgaonkar D B, “Weaving: Machines, Mechanisms and Management”, Mahajan publishers, Ahmedabad, 1981.
4. Talavasek O & Svaty V, “Shuttleless weaving machines”, Elsevier science publications, Newyork, 1981.
5. Hand Book of Nonwovens – Edited by S.J.Russell, Wood head publications Ltd., ISBN- 13: 978-1-85573-603-0, 2007.
6. Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Processes, Edited by Wilhelm Albrecht , Hilmar Fuchs and Walter Kittelmann, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim,, ISBN: 3-527-30406-1, 2003.

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LIST OF EXPERIMENTS **30 Hours**

1. Critically analyze the yarn quality requirements in shuttleless weaving machine.
2. Study of weft accumulator and unconventional selvedge formation in shuttleless weaving machine.
3. Study of weft insertion cycle and picking mechanism in projectile weaving machine.
4. Study of rapier weaving machine and its cycle.
5. Study of rapier drive and calculate the speed and production rate.
6. Critically analyze the air and water quality requirements in fluid jet weaving machine.
7. Create new design in rapier weaving machine.
8. Study of parallel laid web formation in carding machine.
9. Study of needle punching nonwoven machine.
10. Study of thermal bonding nonwoven machine.

Practical: 30 hours	**Total: 30 Hours**


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U18TXI4203 Woven Fabric Structure and Design

L	T	P	J	C
3	0	2	0	4

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Design various weave structures.
CO2: Draw corded structures.
CO3: Illustrate colour and weave effects.
CO4: Draw and analyses the double cloth structures.
CO5: Draw pile structures.

Pre-requisite: U18TXT3003 Fabric Manufacture-I

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S	S			S		S						S	
CO2	S		M										S	
CO3		M												
CO4	M	S											M	
CO5					S									

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

BASIC WEAVES **9 Hours**

Cloth Geometry – Cover Factor – Use of Point Paper – Elementary weaves – plain and its derivatives. Twill and derivatives, Satin – Sateen and derivatives; Ordinary and Brighten Honey Comb, Huck-a-Back and modification. Mock Leno – Distorted Mock leno – Crepe weaves.


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CORD EFFECTS **9 Hours**

Bedford cords: Plain and Twill faced, Wadded welts and piques – Wadded piques – Loose and fast back welts and piques – Spot figuring – Arrangement of figures – Drop Designs Half drop bases – Sateen system of distribution.

COLOUR AND WEAVE EFFECTS **9 Hours**

Colour theory – Light and Pigment Theory – Modification of colour – Application of colours – colour and weave effects. Extra warp and Extra weft figuring – with two colours. Backed fabrics: Warp and Weft backed – Reversible and Non-reversible

DOUBLE CLOTH **9 Hours**

Double cloth: Classification – types of stitches-wadded double cloth – warp and weft wadded double cloth – centre warp and weft stitched double cloth. Ply fabrics.

PILE FABRICS **9 Hours**

Pile fabrics – Warp pile, Fast wire pile – Terry weaves – Terry stripe and checks. Weft pile – Plain back and Twill back velveteen. Lashed pile, corduroy.

Theory 45 Hours	**Total: 45Hours**

REFERENCES

1. Grosicki Z.J., "Watson's Textile Design and Colour" – Butterworths London, 1988.
2. Grosicki Z J, "Advanced Textile Design and Color" – Butterworths London, 2004.
3. Goerner D, "Woven Structure and Design", Part – I – WIRA, 1986
4. Jacquire Wilson, " Hand Book of Textile Design, Woodhead Publishing Ltd, 2001.
5. Robert Beameront, "Colour in Woven Design" Whittaker & Co, 1972.
6. B.K.Behra and P.K.Hari, "Woven Textile Structure (Theory and Application), Woodhead Publishing Limited, 2010.
7. J Herbert Cooke, "Velvet and Corduroy", Sir issac pitman & Sons Ltd, London.

List of Experiments

1. Analysis of plain weave structures.
2. Analysis of twill weave structures.
3. Analysis of satin/sateen weave structures.
4. Analysis of honey comb weave structures.
5. Analysis of Huck a back-weave structures.
6. Analysis of crepe weave structures.
7. Analysis of Bedford cord weave structures.
8. Analysis of extra warp/weft figured weave structures.
9. Analysis of double cloth structures.
10. Analysis of velveteen structures.

Practical: 30 Hours	**Total 30 Hours**

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U18TXP4504 YARN MANUFACTURING TECHNOLOGY LAB

L	T	P	J	C
0	0	2	0	1

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Calculate the production and speed of ring frame.
CO2: Outline the main gearing diagram of ring frame, open-end spinning machine, fancy doublers and TFO.
CO3: Assess the effect of key components on yarn quality.
CO 4: Calculate the draft and draft distribution.
CO 5: Calculate the production, twist and draft constants.

Pre-Requisite: U18TXI3202 Yarn Manufacturing Technology I

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1				S										S
CO2					S									S
CO3					S									S
CO4					S									S
CO5					S									S

Course Assessment methods

Direct	Indirect
1. Observation 2. Lab Exercises 3. Model Practical Examination 4. End Semester Practical Examination	1. Course end survey


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List of Experiment(s)

1. Determination of draft distribution & production calculation in ring frame 1
2. Production of yarn with given specification.
3. Analysis of ring frame builder motion and calculation of winding length & chase height.
4. Effect of spacer on yarn strength in ring frame.
5. Effect of twist on yarn strength in ring frame
6. Production of yarn using compact spinning.
7. Determination of yarn TPI with given specification.
8. Calculate of production & twist calculation in rotor spinning.
9. Production of yarn using rotor spinning with given specification.
10. Production of different types of double yarns using ring doubler and calculate of resultant count.
11. Production of different types fancy yarn using fancy doubler and calculation of resultant count.
12. Production & twist calculation in TFO with 3 positions and its effect on yarn strength.

Practical: 30 Hours	**Total: 30 Hours**


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U18INI4600 ENGINEERING CLINIC - IV

L	T	P	J	C
0	0	4	2	3

Course objectives

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

Course Outcomes (COs)

After successful completion of this course, the students should be able to:

CO1: Identify a practical problems and find a solution.
CO2: Understand the project management techniques.
CO3: Demonstrate their technical report writing and presentation skills.

Pre-requisite: U18INI3600 Engineering Clinic -III

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	S	S	S	S	M	W		S			S		
CO2											S			
CO3										S				

Course Assessment methods:

Direct	Indirect
1.Project reviews 50% 2.Workbook report 10% 3.Demonstration & Viva-voce 40%	1. Course Exit Survey

Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the


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course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the fourth semester, students will focus primarily on Reverse engineering project to improve performance of a product.

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

Total Hours: 90


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U18INT4000 **CONSTITUTION OF INDIA**
(Mandatory course)

L	T	P	J	C
2	0	0	0	0

Course Outcomes: (COs)
After successful completion of this course, the students will be able to:

CO 1: Gain Knowledge about the Constitutional Law of India
CO 2: Understand the Fundamental Rights and Duties of a citizen
CO 3: Apply the concept of Federal structure of Indian Government
CO 4: Analyze the Amendments and Emergency provisions in the Constitution
CO 5: Develop a holistic approach in their life as a Citizen of India

Pre-requisites : NIL

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						M			W			S		
CO2						S		S				M		
CO3									M	S		W		
CO4								W	M			M		
CO5						M		M				S		

Course Assessment methods

Direct
1. Group Activity / Quiz/ Debate / Case studies 2. Class test / Assignment
Indirect
Surveys

THEORY COMPONENT:

Module.1: Introduction to Indian Constitution **4 hours**

Meaning of the constitution law and constitutionalism - Historical perspective of the Constitution - Salient features and characteristics of the Constitution of India

Module.2: Fundamental Rights **8 hours**

Scheme of the fundamental rights - Right to Equality - Fundamental Right under Article 19 - Scope of the Right to Life and Liberty - Fundamental Duties and its legal status - Directive Principles of State Policy – Its importance and implementation


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Module.3: Federal Structure **8 hours**

Federal structure and distribution of legislative and financial powers between the Union and the States - Parliamentary Form of Government in India - The constitutional powers and status of the President of India

Module.4: Amendment to Constitution **6 hours**

Amendment of the Constitutional Powers and Procedure - The historical perspectives of the constitutional amendments in India

Module.5: Emergency Provisions **4 hours**

National Emergency, President Rule, Financial Emergency
Local Self Government – Constitutional Scheme in India

Total **30 hours**

Theory: 30	**Tutorial: 0**	**Practical: 0**	**Project: 0**	**Total: 30 hours**

REFERENCES

1. Constitution of India - Ministry of Law & Justice – PDF format
   awmin.nic.in/coi/coiason29july08.pdf
2. Introduction to the Constitution of India by Durgadas Basu
3. The Constitution of India – Google free material -
   www.constitution.org/cons/india/const.html
4. Parliament of India – PDF format
   download.nos.org/srsec317newE/317EL11.pdf
5. The Role of the President of India – By Prof.Balkrishna
6. Local Government in India – E Book - Pradeep Sachdeva
   https://books.google.com/books/.../Local_Government_in_In...

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U18VET4101	UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY (Common to all UG branches from 2020-2024 batch onwards)	L	T	P	J	C
		2	1	0	0	3

COURSE OUTCOMES:

After successful completion of this course, the students shall be able to

CO 1:	Develop a holistic perspective based on self- exploration about themselves (human being), family, society and nature/existence.
CO 2:	Understand (or develop clarity) of the harmony in the human being, family, society and nature/existence
CO 3:	Strengthen their self-reflection.
CO 4:	Develop commitment and courage to act.

Pre-requisites: - None. Universal Human Values 1 (Desirable)

CO-PO AND CO-PSO MAPPING:

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						M	M	M	S			M	-	-
CO2						S	M		S	S		S	-	-
CO3								M	M		W	S	-	-
CO4								S	M		M	M	-	-

COURSE ASSESSMENT METHODS:

Direct
1. Assessment by faculty mentor 2. Self-assessment 3. Socially relevant project/Group Activities/Assignments 4. End Semester Examination
Indirect


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1. Assessment by peers (Survey form)

COURSE CONTENTS:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I.
2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.
2. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility.
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).
4. Understanding the characteristics and activities of 'I' and harmony in 'I'.
5. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
6. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available tome. Identifying from one's own life.

Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Module 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

1. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
2. Understanding the meaning of Trust; Difference between intention and competence
3. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
4. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
5. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.


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Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature.
3. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space.
4. Holistic perception of harmony at all levels of existence.
5. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
5. Case studies of typical holistic technologies, management models and production systems
6. Strategy for transition from the present state to Universal Human Order:

    a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
    b. At the level of society: as mutually enriching institutions and organizations
7. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. To discuss the conduct as an engineer or scientist etc.

COURSE DURATION:

No	MODULE	HOURS
1	Module 1	[7 Theory+ 3 Tutorial] 10 Hrs
2	Module 2	[6 Theory+ 3 Tutorial] 9 Hrs
3	Module 3	[7 Theory+ 3 Tutorial] 10 Hrs


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4	Module 4	[5 Theory+ 3 Tutorial] 8 Hrs
5	Module 5	[5 Theory+ 3 Tutorial] 8 Hrs
	Total	**45**

Theory: 30 Hours	**Tutorial:15**	**Practical: 0**	**Project: 0**	**Total: 45 Hours**

TEXT BOOK:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCE BOOKS:

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)
14. https://www.youtube.com/watch?v=E1STJoXCXUU&list=PLWDeKF97v9SP_Kt6jqzA3pZ3yA7g_OAQz
15. https://www.youtube.com/channel/UCo8MpJB_aaVwB4LWLAx6AhQ
16. https://www.uhv.org.in/uhv-ii

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SEMESTER V


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U18TXT5001 MECHANICS OF TEXTILE MACHINERY

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Define the importance of gear and belt drives and to express the relationship between tensions in belt drives and also the condition for maximum power transmission.

CO2: Design the profiles of cone drums used in speed frames as well as scutcher, plain and twill tappets and ring frame builder motion cams.

CO3: Calculate the picking force, shuttle velocity and acceleration in weaving machines and to use the equations of motions in textile applications.

CO4: Justify the use of kinetic energy, potential energy and principle of moments in textile industry.

CO5: Explain the importance of friction in textile applications and to point out the applications of brakes and clutches in textile industry and to derive the expressions for the torque transmitting capacity of various types of clutches.

Pre-requisite:

U18MET4007/ Basics of Mechanical Engineering

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak														
COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M		M										M	
CO2					M								M	
CO3			M										M	
CO4				M									M	
CO5	M			M									M	

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Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

DRIVES **9 Hours**

Belts and Ropes- Drive Speed Ratio – Centrifugal tension - Condition for maximum power transmission and speed – PIV drives – Electro Magnetic Drives. Gears Nomenclature - Velocity ratio-Speed calculations - Epicyclic gear trains – speed ratio of differential motion.

CAMS & CONE DRUMS **9 Hours**

Scutcher cone drum profile design and construction. Fly frame cone drum profile design and construction. Cams used in Textile machines – Design of Ring frame builder motion cam. Plain and Twill cams for tappet looms.

MOTION **9 Hours**

Equation of motion – Linear – Rotary - Reciprocation – Oscillation movements, Equation of force – Mass – Momentum – Work – Power – Shuttle Velocity – Picking force and power – ring frame traveler velocity and power consumption.

PRINCIPLE OF MOMENTS **9 Hours**

Kinetic and potential energy calculation for textile application – Principles of moments- Scutcher calendar roller – Ring frame Top arm loading – Forces in heald reversing system.

FRICTION, BRAKES AND CLUTCHES **9 Hours**

Friction: Static, Dynamic and Coil friction – Coefficient of friction – Frictional force and power – Warp tension calculation. Clutches: Single plate – Multiple plate – Cone Clutches - Centrifugal clutch - jaw clutch – Saw toothed clutch. Band and block Brakes – Internal expanding shoe Brakes – Sley displacement – eccentricity relation with crank radius and connecting arm length – velocity – Acceleration – Beat-up force.

Theory 45 Hours	**Total: 45 Hours**

REFERENCES

1. Slater K., “Textile Mechanics, Vol. I & II”, Textile Institute, Manchester, UK, 1987.

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2. Booth J E., “Textile Mathematics, Vol. I, II & III”, Textile Institute, Manchester, UK, 1977.
3. Rengasamy R.S, “Mechanics of Spinning Machines”, NCUTE, Ministry of Textiles, Govt. of India, 2000.
4. Faires V.M., “Design of Machine Elements”, Macmillan & Co, London, 1967.
5. Grosberg P, “Introduction to Textile Mechanics”, Ernest Benn Ltd, London, 1968.
6. W.A. Hanton, “Mechanics for Textile Students”, Butterworths, 1960.
7. Victor Wowk, “Machinery Vibration”, McGraw-Hill, Inc, Newyork, 1995.


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U18TXT5002 TEXTILE AND APPAREL QUALITY EVALUATION

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Describe the concepts of quality and statistical application in textiles.
CO2: Explain the measurement of fibre properties.
CO3: Explain the measurement of yarn properties.
CO4: Summarize the working Principle of fabric testing instruments.
CO5: Summarize on the Garment test procedures.

Pre-requisite:

U18TXI4202: Fabric Manufacture - II

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S												M	
CO2	M		S	M	S									
CO3	M		M	S	S								M	
CO4	S		S	S						M	M		M	
CO5		M	M							M				

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

INTRODUCTION TO QUALITY **9 Hours**

Definition of Quality, Types of quality, factors influencing quality, quality control and quality assurance. Quality control tools and its applications. Objectives of textile testing. Standard test conditions. Accuracy, precision, calibration. Sampling methods, Statistical Quality control: sample size and methods. Applications of 'F' test, 't' test, 'χ^2' test.


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FIBRE TESTING **9 Hours**

Fibre properties - Fibre length: Staple length, Span length – Hand stapling method, Baer sorter, Fibro graph and Uniformity. Fibre fineness: Fibre fineness testers, calculations. Moisture regain, moisture content determination, calculations. Maturity – testing methods of maturity, calculations – High Volume Instruments – Length, Strength, Maturity and Trash & Colour modules – analysis and interpretation of results. Advanced Fibre Information System- Length, Nep and Trash modules – analysis and interpretation of results.

YARN TESTING **9 Hours**

Yarn numbering systems and calculation – Count Determination, Twist and its measurement. Tensile properties of yarn, tensile testing of yarn: Constant Rate of Elongation, Constant Rate of Loading and Constant Rate of Traverse, Factors influencing tensile testing of yarns. Evenness – principle of measurement, imperfections, irregularity charts and calculations. Hairiness – principle of measurement. Classimat faults -Yarn appearance assessment

FABRIC TESTING **9 Hours**

Testing of tensile strength, tearing strength and bursting strength. Testing of dimensional stability – Stiffness, Crease recovery, Hygral expansion and relaxation shrinkage. Testing of air permeability and water repellency. Testing of abrasion resistance and pilling. Testing of handle and drape, calculations. Objective evaluation of fabric handle – KES and FAST systems. Comfort and its types. Fabric Quality Inspection systems.

TESTING OF GARMENTS **9 Hours**

Characteristic requirements of accessories of garments. Testing of Buttons, Snaps, Zippers, Elastic and Hooks. Testing of Linings, Interlinings, and Fusible interlinings. Testing of Sewing threads. Seam – Strength, Slippage, Elasticity and Durability. Quality standards in Garment Industry – Acceptable Quality Level.

Theory :45 Hours	**Total: 45 hours**

REFERENCES

1. Booth J. E., “Principles of Textile Testing” Butterworths, 1996.
2. V.K.Kothari, “Testing and Quality Management” IAFL Publications, 1999.
3. GAV Leaf., “Practical Statistics For The Textile Industry: Part I”, The Textile Institute, 1984.
4. Saville B.P., “Physical Testing of Textiles”, Woodhead publishing -UK, 2004.
5. Jinlian H U, “Fabric Testing”, Woodhead Publishing, 2008.
6. Arindam Basu., “Textile Testing (Fibre, Yarn and Fabric)”, SITRA, Coimbatore, 2001.
7. Somasundar S., “Application of Statistical Methods in Textile Industry”, SITRA, Coimbatore, 1998.

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L	T	P	J	C
3	0	0	0	3

U18TXT5003 TEXTILE CHEMICAL PROCESSING -I

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss the principle and mechanism of singeing, desizing,
CO2: Explain the various methods of scouring, bleaching and mercerization
CO3: Prepare the dye recipe for colouring the various fibre/ fabric
CO4: Examine the colour fastness of the dyed fibre/ fabric
CO5: Explain the working principles of various dyeing machines

Pre-requisite :

U18TXI4202: Fabric Manufacture-II

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S	S	S	W	W	W					M		S	
CO2	S												S	
CO3		M			W									
CO4				M			W							
CO5	S										W		S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/Seminar/ Tutorial 4. End Semester Examination	1. Course end survey


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INTRODUCTION: **9 Hours**

Objectives of textile chemical processing. Process Sequence of Cotton, Silk, Wool, Polyester and Polyester / Cotton blend. Singeing: Objectives. Methods, drawbacks and alternative methods. Desizing: Objectives. Methods and Mechanism of Hydrolytic and Oxidative Desizing, evaluation of desizing efficiency.

CHEMICAL PRETREATMENT : **9 Hours**

Scouring - Objectives. Mechanism of Alkaline and Bio scouring. Bleaching - Objectives. Mechanisms of Oxidative and Reduction Bleaching. Evaluation – Copper Number , Methylene Blue Absorption and Cupprammonium Fluidity. Mercerization**:** Objectives, Mechanism and Methods. Mercerization of knitted fabric and Blends. Liquid Ammonia Treatment. Assessment of Mercerization efficiency.

DYEING OF CELLULOSE AND PROTEIN FIBRES **9 Hours**

Colorants: Classification of Colorants, Theory of dyeing: free volume theory. Dye uptake on textiles. Properties and principle of Dye-fibre interaction and application of Direct, Reactive, Vat, Sulphur, Azoic dyes on cellulose fibres. Application of Acid, Basic and Reactive dyes on wool and silk.

DYEING OF PROTEIN FIBRES, SYNTHETIC FIBRES AND BLENDS **9 Hours**

Mass coloration of synthetic fibres. Dyeing of polyester with Disperse dyes - Carrier, HTHP and Thermosol dyeing. Dyeing of acrylic fabrics with cationic dyes. Dyeing of elastomeric fibres and blends. Dyeing of blends. Assessment of fastness properties of dyed material. Eco friendly chemicals and banned dyes


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DYEING MACHINERIES **9 Hours**

Fibre dyeing machines: Loose stock, bale. Yarn dyeing machines: Hank, Cone and Beam. Fabric dyeing machines: Jigger, Winch, Jet, Soft flow, Infra Red dyeing, Padding mangles. Garment dyeing machines: Paddle and Drum. Washing ranges. Concurrent and counter current washing principle. Drying- Water extraction techniques - mangling, suction drying and centrifuging. Thermal drying – cylinder drying, stenter drying and radiation drying

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. A K Roy Choudhary, “Textile Preparation & Dyeing”, Science Publishers, USA, 2006.
2. Broadbent D.A., “Basic Principles of Colouration”, Society of Dyers &Colourists, 2001.
3. Karmakar S.R., “Chemical Technology in the pretreatment processing of textiles”, Textile Science & Technology, Elsevier Publication, 1999.
4. Shore J, “Cellulosics dyeing”, Society of Dyers &Colourists, Bradford, UK, 1995.
5. Mittal R M and Trivedi S S, “Chemical Processing of polyester / cellulosic Blends”,
6. Trotman, E.R., “Dyeing and Chemical Technology of Textile Fibres”, Charles Griffin and Co. Ltd., London. 1991.
7. Shenai, V.A. “Technology of Bleaching and Mercerizing - Vol. III”, Sevak Publications Chennai, 1991.
8. Bhagwat R.S “Handbook of Textile Processing”, Colour Publication, Mumbai, 1999.
9. Shenai, V.A., “Principle and Practice of Dyeing”, Sevak Publisher, Bombay,1991.
10. T.L.Vigo, “Textile Processing and Properties”, Elsevier, New York, 1994.

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U18TXT5004 **KNITTING TECHNOLOGY**

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Describe the concept of knitting
CO2: Summarize the working Principle of plain, rib and interlock knitting machine
CO3: Examine the Weft knitted structures
CO4: Describe the fundamentals and working of warp knitting machine
CO5: Examine the basic warp knitted structures

Pre-requisites : Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M												M	
CO2	S		M										S	
CO3			M	S						M				
CO4		S			M									
CO5	S		M										S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

INTRODUCTION **9 Hours**

Concept of knitting – Weft knitting, warp knitting - Comparison between woven and knitted fabric. Comparison of warp and weft knitting -Knitting needles: spring beard, latch, compound needles, Knitting cycle of latch, spring bearded and compound needle- Classification of knitting machines. - Yarn quality requirements for weft knitting.


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WEFT KNITTING

9 Hours

Knitting Elements: Cylinder, knitting cam, sinker, feeder, stop motions. Working of plain, rib and interlock knitting machine. Pattern wheel, pattern drum, punched steel tape needle selection mechanism - Electronic Jacquard knitting machines. Basic principles and elements of flat knitting machines- Different types of flat knitting machines; mechanical and computerized knitting machines.

WEFT KNITTED STRUCTURES **9 Hours**

Weft knit structures-Technical terms and symbolic representation of weft knit structures-Characteristics of plain, rib, Interlock, purl knit structures- Fundamentals of formation of knit, tuck and float stitches- Derivatives of weft knit structures: lacoste, accordion and check effect -Faults in knitted fabrics and their causes and remedies - dimensional parameters such as stitch length, WPI, CPI, stitch density, GSM, Tightness factor-spirality-Production calculations of weft knitting.

WARP KNITTING **9 Hours**

Warp knitting machines: needle bar, sinker bar, guide bar –pattern wheel –chain link-Warp knitting fundamentals- Knitting cycle for warp knitting- closed lap and open lap stitches – Raschel, compound needle and Tricot knitting machines- Comparison of raschel and tricot knitting machines. Materials for warp knitting-direct warping and indirect warping for warp knitting. Rack, run-in, quality, production calculations of warp knitting.

WARP KNITTED STRUCTURES **9 Hours**

Representation of warp knit structures – chain link notation – basic warp knitted structures-single for fabrics; Chain or pillar stitch and atlas lap - Two bar structures; Full tricot-Lock knit-Reverse lock knit-Satin. Application of weft and warp knit fabric in Technical Textiles. Seamless knitting; working and advantages.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. D. B Ajgaonkar., “Knitting technology” Universal publication corporation, Mumbai, 1998.
2. Dr.N.Anbumani., “Knitting Fundamentals, Machines, Structures and Developments”, New Age International, 2006.
3. Chandrasekhar Iyer, Bernd Mammel and Wolfgang Schach, “Circular knitting”, Meisenbach Gmbh, Bamberg, 1995.
4. D.J. Spencer., “Knitting technology”, Textile Institute Manchester, 2005.
5. Samuel Raz., “Warp knitting production”, Melliand Textilberichte Gmbh, 1987.
6. Samuel Raz., “Flat Knitting Technology”, C. F. Rees GmbH, 1993
7. Chandrasekhar Iyer, Bernd Mammal and Wolfgang Schach., Circular Kintting, Meisenbach GmbH, Bamberg, 1995.

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U18TXT5005 PROTECTIVE TEXTILES

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to
CO1: Outline suitable textile materials in protective textiles
CO2: Interpret the various protective textile products in defence
CO3: Acquire on material, design and construction of ballistic protective textiles
CO4: Interpret on types, finish and construction of chemical protective textiles
CO5: Outline on other protective textiles used in military applications

Pre-requisites: NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M												M	
CO2			M				S						M	
CO3		M											M	
CO4		M											M	
CO5		M			M								M	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

PROTECTIVE TEXTILES **9 hrs**

Definition - classifications - market potential, design and selection of protective clothing material. military combat clothing systems; camouflage textiles - UV and visible wave band, visual decoys, infrared camouflage.

MATERIALS USED IN PROTECTIVE CLOTH **9 hrs**

Suitability and properties of high performance fibres - chemical composition and physical structure, different fabric types in garment construction according to protective end uses like cold, ballistic, etc.


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BALLISTIC PROTECTION **9 hrs**

Body armors: types - soft and hard - high performance ballistic fibers - fabric structures for body armors - working mechanism - design of ballistic body armors - design of ballistic helmets.

CHEMICAL PROTECTION **9 hrs**

Chemical hazards: toxic and in toxic - interaction between chemical and protective textiles, types of chemical protective clothing, fabric design and their specifications for chemical protection - functional finishing and their performance.

OTHER PROTECTIVE TEXTILES **9 hrs**

Protection against extreme climatic conditions, protection against radiation, high visibility textiles, UV protection, respiratory protection, biological protection - materials, design requirements and properties.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. Eugene Wilusz , "Military textiles", Woodhead publishing Ltd, UK, 2008.
2. Richard A. Scott , "Textiles for protection", Woodhead publishing Ltd, UK, 2005.
3. A.R. Horrocks & S.C. Anand, “Handbook of Technical Textiles”, The Textile Institute, Manchester, U.K., Woodhead Publishing Ltd., Cambridge, England, 2000.
4. S. Adanur “Wellington Sears Handbook of Industrial Textiles”, Technomic Publishing Co. Inc., Lancaster, Pennsylvania, 1995.
5. Pushpa Bajaj and Sengupta A.K, “Protective clothing”, The Textile Institute, 1992.

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U18TXP5505 TEXTILE CHEMICAL PROCESSING LAB-I

L	T	P	J	C
0	0	2	0	1

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Perform the pretreatment of grey fabric processing.
CO2: Prepare the dye recipe for coloring the various fibre/ fabric.
CO3: Perform the dyeing of pretreated fabric.
CO4: Examine the effect of chemical auxiliary on dyeing.
CO5: Examine the colour fastness of the dyed fibre/ fabric.

Pre-requisite :

U18TXI4202: Fabric Manufacture-II

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S				S		S			W				S
CO2	S				S		S							S
CO3	M	M			M		M							M
CO4	M	M			M		M							M
CO5				W	S		S							S

Course Assessment methods

Direct	Indirect
1. Observation 2. Lab Exercises 3. Model Practical Examination 4. End Semester Practical Examination	1. Course end survey

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List of Experiments

1. Desizing of grey fabric with enzyme and determine the desizing efficiency / Tagawa method
2. Scouring of desized cotton fabric and determine the scouring loss%, drop absorbency.
3. Bleaching of cotton fabric with hypochlorite agent and measurement of the whiteness index.
4. Bleaching of cotton fabric with hydrogen peroxide agent and measurement of the whiteness index,
5. Cold and Hot mercerization of cotton yarn and measurement of the BAN, and change in mechanical properties.
6. Dyeing of cotton using direct dyes and studying the influence of Temperature, Time and Electrolyte on dye adsorption.
7. Dyeing of cotton using vat dyes and assessment of fastness properties of dyed material.
8. Dyeing of cotton using hot and cold brand reactive dyes and determine dye exhaustion % on dye bath.
9. Dyeing of cotton using naphthol dyes and assessment of fastness properties of dyed material.
10. Dyeing of polyester using disperse dye with carrier and assessment of fastness properties of dyed material.
11. Dyeing of silk using acid dyes and assessment of fastness properties of dyed material.
12. Dyeing of cotton/polyester blended material with reactive/disperse dye and assessment of fastness properties of dyed material.

Practical: 30 Hours **Total: 30 Hours**


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U18TXP5506 TEXTILE AND APPAREL QUALITY EVALUATION LAB

L	T	P	J	C
0	0	2	0	1

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Calculation of maturity, fineness, crimp, yarn numbering system, evenness, hairiness.

CO2: Summarize the working Principle of all testing instruments of fibre, yarn & fabric.

CO3: Analyze and interpret the results of testing of fibre, yarn & fabric properties with statistical analysis.

CO4: Examine the material with testing results.

CO5: Evaluate the results with various types of materials.

Pre-requisite:

U18TXI4202: Fabric Manufacture- II

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S			S	M									
CO2	M	S	S		M									M
CO3														
CO4														M
CO5	S		S											

Course Assessment methods

Direct	Indirect
1. Observation 2. Lab Exercises 3. Model Practical Examination 4. End Semester Practical Examination	1. Course end survey

List of Experiments

1. Determination of the percentage of Trash, Lint, Micro dust, Invisible loss using Trash analyzer and Determination of fineness & its C.V% of the two different cotton fibre samples using Micronaire tester.
2. Determination of the Effective length, Mean length and Short fibre % of the given cotton fibre sample using Baer Sorter.

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3. Determination of Hank and Hank C.V % (within & between) of the given blow room/comber lap.
4. Determination of the Hank and Hank C.V% of the given sliver / Determination of the within bobbin and between bobbin hank C.V % of the given roving.
5. Determination of the Single yarn strength of the given yarn sample
6. Determination of Single yarn and Ply yarn twist of the given yarn.
7. Determination of the Yarn count, Lea Strength and CSP of the given yarn sample.
8. Determination of the Air permeability and Fabric Impact Strength of the given fabric.
9. Determination of the Fabric thickness, Stiffness and Crease recovery for the given fabric
10. Determination of the Fabric Drape and Bursting strength of the fabric.
11. Determination of the Fabric Abrasion Resistance and Fabric Pilling for the given fabric.
12. Determination of the Fabric Tensile strength of the given fabric sample using tensile tester.

Practical: 30 Hours	**Total: 30 Hours**


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SEMESTER VI


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L	T	P	J	C
2	0	2	0	3

U18TXI6201 GARMENT MANUFACTURING TECHNOLOGY

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Develop the pattern making, grading and marker making for Kids, Baby's, Men's and Women's wear.

CO2: Discuss the Requirements and Methods of Marker planning and Cutting.

CO3: Describe different types of Stitches & Seams and sewing machine.

CO4: Explain different types of accessories used in garment industry.

CO5: Explain different types of pressing methods.

Pre-requisite: NIL

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S	S	S		M								S	
CO2	M	S	S		S								M	
CO3	M												M	
CO4	M												M	
CO5	S	S	S							M			S	

PATTERN MAKING 6 Hours

Introduction to garment manufacturing-Pattern making: Definition- Head theory- Measuring of sizes and Size chart-Seam allowances- Drafting, Grading and Draping- Grain lines- Dart. Development of patterns: Kids wear: Baby's frock- Men's wear: Shirt and Trouser- Women's wear: Plain skirt.

CUTTING 6 Hours

Marker planning: Requirements and Methods-Marker efficiency-Advantages of computer aided marker planning. Spreading: Requirements and Methods-Types spreading and lay. Cutting: Objectives-methods- cutting machines-Straight knife-Round knife-Band knife- Die cutting-computer controlled cutting-Lectra-Gerber-Tuka-Reach CAD-3D Body Scan.

SEWING 6 Hours

Definition of Stitch and Seam- Stitch and Seam classifications- Classification of sewing machines – based on application, based on bed type. Basic stitching machine-principle parts and their functions. Mechanism of stitch formation in lock stitch machine -Feed system: Drop feed system-Unison feed-Differential feed-Compound feed. Stitch and seam defects – causes and remedial measures


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APPAREL ACCESSORIES **6 Hours**

Needle – types and selection. Sewing thread–types and applications- ticket number. Supporting materials & closures--buttons-Zippers-Velcro-Hook and eye-Hook and Bar-Fasteners-Closures-Lining-Interlining-Wadding-Tapes-Elastic- Popular brands.

FUSING, PRESSING AND PACKING **6 Hours**

Fusing: Means-equipment and Methods-Requirements- Pressing: Purpose -Categories - Means- Equipment and methods-Pleating- Permanent press. Packing-Method-types-Components of packing

Theory 30 Hours	**Total : 30 Hours**

REFERENCES

1. Harold Carr and Barbara Latham, "The Technology of clothing manufacture", 4th Edition Wiley-Blackwell, 2008.
2. K.R.Zarapkar, "System of cutting", Navneet Publications, Mumbai,2005.
3. Jacob Solinger, "Apparel Manufacturing Handbook", Van Nostrand Reinhold Company, 1988.
4. Hayden Peggal, "The Complete Dress Maker", Marshal Cavendish, London, 1984.
5. Laing R.M. and Webster J,"Fundamentals of stitches and Seams", Textile Institute, 1998.
6. Gerry Cooklin, Steven George Hayes and John McLoughlin, "Introduction to Clothing Manufacture", Wiley-Blackwell, 2006.

List of Experiments **30 Hours**

1. Developing pattern for Baby frock.
2. Developing pattern for Men's shirt.
3. Developing pattern for Trousers.
4. Prepare manual marker plan for plain /check/stripe fabric, Optimization of marker efficiency by trial and error method.
5. Demonstrate sewing operation in Single Needle Lock Stitch Machine, Machine adjustments-Threading-SPI and Tension.
6. Construction of Various stitches and Seams.
7. Prepare trim card for one garment- Baby frock, Men's shirt, Trousers & skirt
8. Demonstrate Sewing operations in Overlock and Flat lock machines and machine adjustments-Threading-SPI and Tension setting.
9. Study on fusing and pressing machines.
10. Conduct quality audit and measurement check for garment.

Practical 30 Hours	**Total 30 Hours**

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U18TXI6202 TEXTILE CHEMICAL PROCESSING -II

L	T	P	J	C
3	0	2	0	4

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss the style and methods of printing.
CO2: Explain the working principle of various printing machines.
CO3: Contrast the mechanism of various finishes.
CO4: Explain the mechanism of functional finishes.
CO5: Summarize the pollution control measures in textile processing industry.

Pre-requisite:

U18TXT5003: Textile Chemical Processing -I

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S		M			W							S	
CO2	S												S	
CO3				M										
CO4		S		S	W									
CO5	S		W		M	M							S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

CHEMICAL CONCEPTS OF PRINTING **9 Hours**

Sequence of printing process. Styles of printing: Direct, Discharge, Resist. Printing Methods- block, roller, screen printing. Essential ingredients of print paste and their functions. Mechanism of color transfer in printing of cotton, wool, silk and polyester material with direct, reactive, vat, metal complex, acid dye and pigments for different styles.

PRINTING MACHINES **9 Hours**

Printing machines- Roller printing, Screen printing: flat bed, rotary screen printing machines. Preparation of screens for flat bed and rotary printing. Transfer printing: Principle, machines, sublimation transfer printing. Digital Printing: Digital Colour management systems- principle of charged drop printer and drop on demand printers. Flock printing: Beater Bar Method and Electrostatic method. Working principle of batch and continuous steamer. Fixation and after treatments.


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FINISHING **9 Hours**

Classification of finishing: Wet and Dry /Chemical and Mechanical finishing. Calendaring: Swissing, chasing, friction, Schreinering, embossing. Anti-shrinking finishing: Principle of controlled compressive shrinkage/zero-zero finish, compacting, decatising and anti-felting. Raising and shearing techniques. Softeners: Mechanisms, Types- Anionic, cationic, Non-ionic and Reactive softeners. Silicone softeners. Effect of softeners. Crease resistant finish: Cross linking agents-Nitrogenous and Non-nitrogenous resins- Mechanisms of easy-care and durable press finishing. Application methods.

FUNCTIONAL FINISHES **9 Hours**

Water proof and repellent finishes: Mechanisms of repellency, Paraffin repellents, Stearic acid–melamine repellents, Silicone water repellents, Fluorocarbon-based repellents. Flame resistance finishes: Theory and Mechanisms of flame retardancy, Flame retardants for cellulose, polyester and its blends, application methods. Soil release finish: Mechanisms of soil release. Antimicrobial finishes: Mechanisms of antimicrobial finishes. Bio-polishing for cellulose material. Anti-static finishes: Mechanism, durable and nondurable antistatic finish. UV Protection finish. Assessment techniques for UV Finishes.

WASTE MINIMIZATION AND TEXTILE EFFLUENTS **9 Hours**

Waste minimization and its opportunities – need for waste minimization – chemical and auxiliary's conservation, water conservation, energy conservation. Textile waste water problems. Textile effluent - techniques of effluent treatments – Flow chart of primary, secondary and tertiary treatment.

Theory: 45 Hours **Total: 45 Hours**

REFERENCES

1. Shenai, V.A., "Technology of Printing", Sevak Publications, Bombay, 1996.
2. Shenai, V.A., "Technology of Textile Finishing", Sevak Publications, Bombay, 1995.
3. Marsh, J.T., "An Introduction to Textile Finishing", Chapman and Hall Ltd., London, 1979.
4. W.D.Schindler and P.J.Hauser, Chemical finishing of Textiles, CRC Pr LIC Publication, 2004.

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5. Charles Tomasino, Chemistry and Technology of Fabric Preparation and Finishing, Department of Textile Engineering, Chemistry and Science College of Textiles, North Carolina State University, 1992
6. Heywood, "Textile Finishing", Woodhead Publishing Limited, 2003.
7. LWC Miles, "Textile Printing", Society of Dyers and Colourists, Wood head Publishing Limited, 2003.
8. From waste to profits, technical manual series III, National productivity council, new Delhi, 1998
9. Padmavankar, Textile Effluent NCUTE, IIT Publication, 2002.

List of Experiments: 30 Hours

1. Printing of cotton fabric with direct style printing and assessment of fastness properties of printed material.
2. Printing of cotton fabric with discharge style printing and assessment of fastness properties of printed material.
3. Printing of cotton fabric with resist style printing and assessment of fastness properties of printed material.
4. Finishing of cotton fabric using starch and evaluation of stiffness and add-on%.
5. Finishing of cotton fabric using softeners and evaluation of drape and add-on%.
6. Crease Proofing of cotton fabric and evaluation of crease recovery angle.
7. Assessment of shrinkage of woven and knitted fabrics.
8. Finishing of cotton fabric with anti-pilling finish and evaluation of pilling.
9. Finishing of cotton fabric with water repellent finish and evaluation of wetting angle.
10. Finishing of cotton fabric with flame retardant finish and evaluation of LOI.
11. Finishing of cotton fabric with soil release finish and measure the ability of fabric to release oily stains during home laundering.
12. Determination of the colour difference and colour strength value of dyed material using computer colour matching system

Practical 30 Hours	**Total 30 Hours**


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L	T	P	J	C
3	0	0	0	3

U18TXT6003 PROCESS CONTROL IN SPINNING AND WEAVING

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Outline the various fibre quality characteristics.

CO2: Evaluate yarn realization, waste%, Invisible loss and various wastes.

CO3: Interpret the causes of various levels of cleaning efficiency and Solve the productivity calculations

CO4: Illustrate the various technical parameters related to yarn quality

CO5: Explain process control in the weaving process.

Pre-requisite : U18TXT5002 Textile and Apparel Quality Evaluation

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S	S											S	
CO2	S	S											S	
CO3	S	S											S	
CO4	S	S											S	
CO5	S	S											S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

CONTROL OF FIBRE QUALITY **9 Hours**

Quality control of mixing through fibre quality characteristics - Fibre Quality Index – Blending Irregularity – Fibre Rupture Analysis – Causes of nep generation – nep removal in carding and combing machines – On line nep monitoring. Levelling in Blow room, carding and drawing, -Contamination & its Control-Online monitoring of contamination – Stickiness: causes, effect & control strategies.

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CONTROL OF YARN REALIZATION & WASTE **9 Hours**

Yarn realization: Definition -calculation for carded and combed process - Recording procedures - Norms - Invisible loss and its impact. Control of waste in blow room, carding and comber: Methods – Calculations – Norms. Control of soft waste – Soft waste addition in mixing. Control of hard waste in ring frame and cone winding - Methods , Norms.

CLEANING EFFICIENCY AND PRODUCTIVITY **9 Hours**

Cleaning efficiency in blow room & carding: Definition – Importance - Cleaning efficiency of the various beaters - various factors are influencing cleaning efficiency – Norms. RH% and its importance- Productivity calculations: HOK, OHS, Spindle Utilization & Productivity Index (PI).

YARN QUALITY CONTROL **9 Hours**

Within bobbin & between bobbin count variations: Causes, effects and remedies. Unevenness: causes, effects& control measures, Hairiness: Causes, effects and control strategies. Effect of roller setting, spacer, top arm pressure and top roller cots on yarn quality. Cots and aprons: selection for coarse, fine and synthetic yarn processing. Traveller selection for various counts. Yarn Faults: Classification-Causes - methods to reduce faults. Strength C.V% and its control. End breakage: causes – snap study – measures to control end breakage - norms.

PROCESS CONTROL IN WEAVING **9 Hours**

Process control in Winding: Quality of Knots and Splices- quality of package –package density - control of hard waste. Process Control in Warping - warping and Sectional Warping – Performance, Process Parameters - minimizing end breaks - Quality of warper's beam - control of hard waste. Process control in sizing - control of size pick up, Size encapsulation, optimum size add-on, control of yarn stretch and moisture-Quality of sized beam- control of hard waste. Process control in drawing-in and warp tyeing. Process and quality control in loom shed: Loom efficiency, Factors influencing loom efficiency, hard waste. Ambient Conditions.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. Abhijit Majumdar, Apurba Das , R. Alagirusamy, V. K. Kothari, "Process Control in Textile Manufacturing", Woodhead Publishing Series in Textiles, November 2012.
2. R. Senthil Kumar, "Process Management in Spinning" CRC Press, USA, September 2014
3. Garde. A. R. & Subramaniam T. A., "Process Control in Spinning", ATIRA, Ahmadabad 1987.
4. M.C.Paliwal & P.D. Kimothi., "Process Control in Weaving", ATIRA, Ahmedabad, 1974.
5. Van der Sluijs M and Hunter L., "Neps in Cotton Lint", Textile Progress Volume: 2 Number:4, The Textile Institute, Manchester, U.K., 1999.
6. Ratnam T.V. & Chellamani. K. P., "Quality Control in Spinning", SITRA Coimbatore 1999.

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7. “Loom shed”, BTRA Publication, Mumbai, 1986.
8. “Warping and Sizing”, BTRA Publication, Mumbai, 1983.
9. “Winding”, BTRA Publication, Mumbai, 1986.


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SEMESTER VII


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U18TXT7001 TECHNICAL TEXTILES

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Describe the scope and classification of technical textiles.

CO2: Outline the fibres, yarns and fabric types used in technical textiles.

CO3: Classify the properties required for fabric constituent to use in Agro textiles, Geo textiles and filtration textiles.

CO4: Deduce role of textile materials in the medical textiles product development.

CO5: Outline the functions and various requirements of protective textiles, sports textiles and transportation textiles.

Pre-requisite:

U18TXI4202 : Fabric Manufacture II

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S													
CO2	S		M										M	
CO3	M	M	S		M									
CO4		S	M		S					M	M		M	
CO5		M	S		S					M				

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

INTRODUCTION **9 Hours**

Technical Textiles: Definition and scope of technical textiles, Global and Indian Scenario, Classification of technical textiles. Fibres used in Technical textiles, Technical yarns: staple yarns, monofilament, multifilament yarns. Technical fabrics: knitted, woven, nonwoven and braided structures – Technical Textile Exhibitions.


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AGRO TEXTILES AND FILTRATION TEXTILES **9 Hours**

Agro textiles**:** Fibres, Yarns, Fabric types and their construction details, Properties and applications. Textiles in Filtration**:** Dust collection principles, Fabric construction, finishing treatments. Solid-Liquid Filtration: Yarn types and fabric constructions, Production equipment, finishing treatments, fabric test procedure.

GEOTEXTILES AND MEDICAL TEXTILES **9 Hours**

Textiles in Civil Engineering**:** Geosynthetics and their types, Geotextiles: Essential properties of Geotextiles - engineering properties of Geotextiles - Frictional resistance of Geotextiles. Medical Textiles: Non-implantable materials, Extra-corporeal devices, Implantable materials, and Healthcare / hygiene textile products.

PROTECTIVE TEXTILES **9 Hours**

Overview of protective clothing, Selection of protective clothing materials, fibres and fabrics for Protective Textiles. Textiles for environmental protection, Thermal insulation materials, Water vapour permeable and waterproof materials, Military combat clothing systems, Camouflage concealment and deception, Flame-retardant and Heat protective textiles, Ballistic protective materials, Biological and chemical warfare protection, Other Survival textiles.

TRANSPORTATION AND SPORTS TEXTILES **9 Hours**

Textiles in Transportation, Textiles in road vehicles: Car seat, Air bag, Seat belt, Filters, Carpets, Belts, Tyre cords and Hoses. Textiles in Rail applications, Textiles in aircraft, space and marine applications. Sports Textiles: Innovation in fibres & textile materials for sportswear – Design consideration of sportswear – Comfort – Sports foot wear: functional design, materials. Textile composites in sports products. Sailing fabrics.

Theory: 45 Hours **Total: 45 Hours**

REFERENCES

1. A.R. Horrocks & S.C. Anand (Edrs.), “Handbook of Technical Textiles”, The Textile Institute, Manchester, U.K., Woodhead Publishing Ltd., Cambridge, England, 2000.
2. S. Adanur “Wellington Sears Handbook of Industrial Textiles”, Technomic Publishing Co. Inc., Lancaster, Pennsylvania, 1995.
3. N.W.M. John, “Geotextiles”, Blackie, London, 1987.
4. S.K. Mukhopadhyay and J.F. Partridge, “Automotive Textiles”, Text. Prog, Vol. 29, No.1/2, 1998.
5. S. Anand, “Medical Textiles”, Textile Institute, 1996.

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6. R.Shishoo, Textiles in Sports, CRC press, 2005.
7. R.Senthil Kumar, Textiles for Industrial Applications, CRC press, USA, August 2013.
8. A.K.Sen, Coated Textiles: Principal and Applications, Techno,ic Publication, Lancaster, Pennsylvania, USA, 2001.
9. Walter Fung and Mike Hard Castle, Textiles in Automotive Engineering, Woodhead Publication, USA, 2001.
10. Richard. A.Scott, Textiles for Protection, CRC press, Woodhead Publication, USA, 2005.


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U18TXT7002 TEXTILE AND APPAREL COSTING

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss the cost management concepts.
CO2: Explain elements of cost of a product.
CO3: Discuss various expenses incurred in textile industry.
CO4: Elaborate factors influencing costing of textile product.
CO5: Prepare cost sheet for garment industry.

Pre Requisite:

U18TXI6201 : Garment Manufacturing Technology

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M													
CO2	M	M											M	
CO3		M		S	M									
CO4	M	M		S										
CO5		M												

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

INTRODUCTION **9 Hours**

Costing: Aims of costing- Costing as an aid to management. Cost terms related to income measurement, profit planning and cost control for textile industry. Inventory control in textile


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industry, Types of costing- Aims of estimation - Difference between Estimation and Costing - Types of estimates.

ELEMENTS OF COST **9 Hours**

Elements of cost –Fixed cost, Variable cost- Material cost – Labour cost – Different types of expenses – Cost of product – Advertisement cost. Factors affecting pricing, Full-cost pricing, Marginal cost pricing. Cost sheet.

COSTING STRATEGY **9 Hours**

Analysis of overhead expenses – Factory expenses – Administrative expenses – Selling and distribution expenses – Allocation of overhead expenses – Depreciation: Causes and reasons– Methods of calculating depreciation –Break even analysis - Simple calculations.

COSTING OF TEXTILE PRODUCTS **9 Hours**

Yarn costing - Fabric Costing - Costing of fabric processing – Factors that determination of the price of garments –Cost of components - Job-order costing for a garment industry. Batch costing. Process costing; waste cost and its control in a textile mill. CMT (Cutting, Making & Trimming) Cost, simple cost calculations.

COSTING OF ACCESSORIES **9 Hours**

Packing and labeling cost – different types and functions – Cost of bought out components. Shipment cost - Duty drawback. Cost calculation of Ladies and Men and Children's wear – Woven and Knitted - Simple calculations.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. Raj kishore Nayak, Rajiv Padhye., "Garment Manufacturing Technology", Woodhead Publishing in association with The Textile Institute, UK,2015.
2. Lall Nigam B.M and Jain I.C., "Cost accounting: Principles & practice Prentice Hall India, 2000.
3. Jain S.P., Narang.K.L., "Elements of Cost Accounting", Kalyani publishers, 2000.
4. Johnson Maurice, E. Moore, "Apparel Product Development", Om Book Service, 2001.
5. Katherine McKelvy, "Fashion Source Book", Om Book Service, 2001.
6. Jain S.P., Narang, K.L., "Cost Accounting –Principles and Practice", Kalyani Publishers, 2009.
7. Larry M,Walther& Christopher J Kousen, " Managerial and Cost Accounting", Ventus Publishing,ISBN:978 87 7681 491 5 (2009)

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8. M.Krishnakumar “Apparel Costing: A functional Approach” Abhishek Publications, 2011, ISBN, 8182473926.

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U18TXT7003 TEXTILE MILL MANAGEMENT

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Understand Indian textile policy.
CO2: Understand the Central and State Government Schemes in Indian textile sector.
CO3: Understand the textile mill organization and planning
CO4: Understand the Power requirements for textile mill.
CO5: Understand the Personnel and Marketing Management in textile mill.

Pre Requisite:
U18TXT6003 Process Control in Spinning and Weaving

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1		M			S									
CO2	M		S											
CO3	M	M											S	
CO4			S		S								M	
CO5					S									

Course Assessment methods

Direct	Indirect
1.Internal test I 2. Internal test II 3.Assignment/ Seminar/ Tutorial 4.End Semester Examination	1,Course end survey

Textile Industry **9 Hours**

Global scenario – Indian textile Industry – Indian Textile Policy – Trade policy – Fiscal policy – NTC – STC – Textile committee – National Hand loom Development Corporation – Mills association – Research institutions – Technical Textile Units – Current five year Plan: Targets and


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achievements; statistics on global and national fibre, yarn and fabric production, consumption, exports and imports; government policies; taxes and tariff structure; power scenario and energy management in textile mills.

Central and State Government Schemes **9 Hours**

Technology Up-gradation Fund Scheme (TUFS) – Textile Workers Rehabilitation Fund Scheme – Technology Mission on cotton – Group Work Shed Scheme – Integrated Scheme for Power loom Development – Group Insurance scheme – Scheme for Integrated Textile Parks – Hank Yarn Obligation (HYO) Tamil Nadu Industrial Investment Corporation: Small and Medium Enterprises fund, Technical Textiles Scheme, Integrated Processing Development Scheme, Integrated Skill Development Scheme for the Textiles and Apparel Sector, Textile Workers Rehabilitation Fund Scheme

Mill Organization and Planning **9 Hours**

Organizational Structure and Functioning of Centralized and Decentralized Sectors: Spinning – Weaving – Composite mill – Chemical processing Units. ERP – MIS – Cotton Purchase Practices – Inventory control – Spin plan – Weave plan – Product costing – Managerial responsibilities. Selection of site for textile mills – Various types of buildings. Selection and balancing ofmachinery – Machinery layout – Technical specifications.

Utilities **9 Hours**

Power requirements for spinning, weaving, Knitting and Garment machinery – Amenities required – Ventilation, Humidification systems – RH and temperature of various departments.
Lighting types – Intensity requirements

Personnel and Marketing Management **9 Hours**

Planning – Selection – Training – Welfare safety – Factory act – Industrial dispute act – Trade union act – Bonus act – ESI, wage structure in textiles and apparel industry – Categories of operatives in textile mills – HOK – OHS. Marketing channel – Physical distribution – Global markets centre of textile – International trade and documentation processes.

Theory: 45 Hours	**Total: 45 Hours**

References

1. A. Ormerod, Textile Product Management, The Textile Institute, Manchester 1992.
2. Handbook of Import and Export Procedures, T extile Commissioner's Office Reports, Government of India, Ministry of Textiles, Government of India Publications (2005 – 2010).
3. V. D. Dudeja, Management of Textile Industry, Textile Trade Press, Ahmedabad 1990.
4. Naresh Grover "Textile Mill Management : Theory And Practice" Random Publications,Delhi,2013.

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U18TXP7504 TEXTILE AND APPAREL CAD LAB

L	T	P	J	C
0	0	2	0	1

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Practice weave design using software tools.
CO2: Develop 2D fabric simulation with different weaves for dobby and jacquard design.
CO3: Create various types of motifs for printing with repeat designs.
CO4: Develop garment patterns for children's wear using CAD software.
CO5: Develop garment patterns for men's and women's wear using CAD software.

Pre-requisite:

U18TXI6201 Garment Manufacturing Technology

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M	M			S									S
CO2	M	M			S									S
CO3	M	M			S									S
CO4	M	M			S									S
CO5	M	M		M	S									S

Course Assessment methods

Direct	Indirect
1. Observation 2. Lab Exercises 3. Model Practical Examination 4. End Semester Practical Examination	1. Course end survey

List of Experiment(s)

Development of various motifs using software tools.

1. Sketch and design a garment including accessories.
2. Development of a dobby design for checked fabric & preparation of 2D simulation.
3. Development of a Jacquard design & preparation of 2D simulation.
4. Development of a Print design and making screen for individual colours.
5. Development of a repeats for Home Textiles.
6. Developing design, pattern and marker plan for baby frock. Calculation of marker efficiency.
7. Developing design, pattern and marker plan for romper. Calculation of marker efficiency.


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8. Developing design, pattern and marker plan for “T” shirt. Calculation of marker efficiency.
9. Developing design, pattern and marker plan for a ladies top. Calculation of marker efficiency and development of a lay plan.
10. Developing design, pattern and marker plan for a ladies skirt. Calculation of marker efficiency.
11. Developing design, pattern and marker plan for men’s formal trouser. Calculation of marker efficiency.

Practical: 30 Hours	**Total: 30 Hours**

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U18TXP7505 TESTING OF TECHNICAL TEXTILES LAB

L	T	P	J	C
0	0	2	0	1

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Construct composite material and determining its mechanical properties.

CO2: Manipulate the permeability characteristics of filter textiles and sport textiles.

CO3: Acquire details about mechanical properties of geo textiles, packing textiles and medical textiles.

CO4: Demonstrate waterproof/wound care/felts, textile material behavior related to water management.

CO5: Specify flame characteristics of flame-retardant textiles and abrasive nature of coated textiles.

Pre-requisite:

U18TXP5506 Textile and Apparel Quality Evaluation Lab

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1				S			M							
CO2					S		M							M
CO3	S					M								M
CO4			S											
CO5					S									

Course Assessment methods

Direct	Indirect
1. Observation 2. Lab Exercises 3. Model Practical Examination 4. End Semester Practical Examination	1. Course end survey

List of Experiments

1. Determination of stiffness and bursting strength of the given nonwoven fabric.

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2. Determination of air permeability and construction details of filters.
3. Determination of air and water vapor permeability characteristics of the given sports textiles.
4. Determination of the construction details and tearing strength of the given packaging technical textiles.
5. Determination of stiffness, thickness and abrasion resistance of the given coated technical textiles.
6. Determination of construction details and mechanical strength of the given geo textiles.
7. Determination of the water resistance/repellency tendency of water proof textiles.
8. Determination of the water absorbency / retention of given medical wound care material / felt textiles.
9. Determination of the flammability characteristic of the given fire proof fabric.
10. Determination of the construction particulars and tenacity of the different suture threads.
11. Production of fibre reinforced composites and determination of the fibre volume fraction / fibre mass fraction.
12. Determination of the mechanical properties of given composite materials.

Practical: 30 Hours	**Total: 30 Hours**


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SEMESTER-VIII


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PROFESSIONAL ELECTIVES


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L	T	P	J	C
3	0	0	0	3

U18TXE0001 MANUFACTURED FIBRE TECHNOLOGY

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss the fundamental concepts of polymerization techniques.

CO2: Explain the manufacturing process of various regenerated fibres.

CO3: Explain the manufacturing process of various synthetic fibres.

CO4: Summarize various post spinning operations preferred in manmade fibres.

CO5: Outline the characterization techniques of manmade fibres.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S	M	M										S	
CO2					S	M				M				
CO3				S	S					M				
CO4	M			S									M	
CO5	S	S											S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

INTRODUCTION **9 Hours**

Molecular size and interaction-molecular orientation and crystallinity in fibres- fibre morphology- thermal transitions. Polymerization techniques. Basic principles of fluid flow during fibre spinning: viscous flow, Newtonian fluids. Components of spinning of process: extruder gear pump, filters, manifold, spinning head, quenching chamber and winder. Introduction to staple and filament yarn manufacturing.


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REGENERATED FIBRE **9 Hours**

Manufacturing process of Viscose rayon fibre. Manufacture process Cellulose derivative fibre, Soya bean fibre and bicomponent fibre with different cross section and super absorbent fibre. Encapsulation technique in fibre formation.

SYNTHETIC FIBRES **9 Hours**

Manufacturing process of polyester, Nylon 6 and Nylon 66. Specialty polyamide and polyester fibres. Manufacturing process of Polyethylene and Polypropylene fibre. Manufacturing process of Acrylic fibre. Manufacturing process of Elastomeric fibres.

POST SPINNING PROCESS **9 Hours**

Spin finish: Properties, components and application techniques. Additives used in fibre manufacturing. Introduction to delusturing. Drawing and Heat setting: mechanism, changes in structure and properties of fibre. Tow to top conversion. Texturising: False Twist, Air Texturising, stuffer-box, edge crimped and Draw texturising process.

CHARACTERIZATION OF FIBRES **9 Hours**

Characterization at molecular level: molecular weight averages, end group analysis, membrane osmometry, and viscometry–thermal characterization: differential thermal calorimetryanalysis, thermogravimetry and thermomechanical analysis.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. V.B. Gupta and V. K. Kothari, “Manufactured Fibre Technology”, Chapman and hall, First edition 1997.
2. A Vaidya, “Production of synthetic fibres”, Prentice Hall of India Pvt. Ltd., New Delhi, 1988.
3. H.G Mark, S. M Atlas and D. Certia. E. (Editors), “Man madefibres-science and Technology”, Vol. I III, Inter science publishers, New York, 1987.
4. Usenko, V., “Processing of Man-Made fibres”, MIR publishers, Moscow, 1985.
5. MenachemLewin and Eli M. Pearce (editors), “Handbook of fibre science and Technology: Vol. IV Fibre chemistry”, Marcel Decker Inc., New York, 1985.
6. R.W.Moncrief, “Man Made fibres”, 6th edition, London Newnes-Butterworths,1975
7. J. Gordon Cook, “Hand book of Textile fibres (Volume 2 – Manmade fibres)”, CBS Publishers and Distributors, 2005

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U18TXE0002 HIGH PERFORMANCE FIBERS

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss the aramid and sulphur based fibres.

CO2: Explain the fundamentals, manufacturing, properties and applications of carbon and glass fibres

CO3: Differentiate the structure, manufacturing methods, properties and applications of ceramic, elastomeric and PBI fibres.

CO4: Demonstrate about the various aspects of metallic fibres.

CO5: Describe about the newly developed fibres.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S												S	
CO2		M											M	
CO3		M											M	
CO4		S	S	M									S	
CO5		S			S								S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

ARAMID AND SULPHER BASED FIBRES **9 Hours**

Requirements of high performance fibres. Aramid fibre – Kevlar fiber - Formation – Structure – Properties and application. Nomex fiber – formation – structure – properties and application. Polyphenyl sulphide fibres - Fibre formation - Properties – Applications.


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CARBON AND GLASS FIBRES **9 Hours**

Classification of Carbon fibres - Manufacturing processes from Polyacrylonitrile (PAN), Rayon and Pitch based fibres - Properties and Applications. Glass fibres –Optical fibres Types and composition -manufacturing processes - Fibre structure - Properties - Applications.

CERAMIC, ELASTOMERIC AND PBI FIBRES **9 Hours**

Ceramic fibres – classification, fibre formation, composition, structure, properties and applications. Elastomeric (Polyurethane) fibres - manufacturing processes - Properties - Applications. HDPE fibres- manufacturing processes - Properties -Applications. Polybenzimidazole (PBI) - Fibre formation, structure, properties and applications.

METALLIC FIBRES **9 Hours**

Metallic fibres -. Steel fibre - Formation – Structure – Properties and application. Aluminium Oxide fibres - Preparation and manufacturing process - Properties - Applications – Composites of Aluminium Oxide fibres. Lead fibres – Fibre Preparation - Properties - Applications - Sound Control and Radiation Shielding Materials.

9 Hours

NEW FIBRES

Polystyrene based fibres - Preparation - Properties – Applications. Micro fibres- Preparation – Properties; Bio-absorbable fibres from Cotton, Rayon, Poly Lactic Acid (PLA); Nano-fibres, Ultra-fine fibres, Hollow fibres and its uses.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. Mukhopadyay S.K., “High Performance Fibres”, Textile Progress, Textile Institute, Manchester, Vol. 25, 1993.
2. Menachem Lewin and Jack Preston., “High Technology fibres - part B”, Marcel Dekker, New York, 1989.
3. Gupta V.B. and Kothari V.K., “Manufactured Fibre Technology”, Chapman Hall Publishing Company, 1997.
4. Anand S.C., “Medical textiles: Proceedings of the 2nd International conference” Bolton, UK. 2001.
5. Menachem Lewin & Jack Preston, “High Technology Fibres - Part A”, Marcel Dekker, New York, 1985.

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U18TXE0003 MANUFACTURE OF SPECIALTY YARNS AND FABRICS

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Understand the production and application of various specialty yarns.
CO2: Design and application of fancy yarns**.**
CO3: Understand the production and application of various specialty fabrics.
CO4: Understand industrial application of specialty fabrics.
CO5: Understand the Pile surfaced carpet weaves.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M												M	
CO2		M												
CO3	M												M	
CO4				M										
CO5					M									

Course Assessment Methods

Direct	Indirect
1.Internal test I 2.Internal test II 3.Assignment/ Seminar/ Tutorial 4,End Semester Examination	1.Course end survey

MANUFACTURING ATTITUDES AND THE APPLICATIONS OF FANCY YARNS **9 Hours**

Manufacturing attitudes and equipment, Applications for fancy yarns, Structures and formation of fancy yarns, The design and application of fancy yarns.


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MANUFACTURING TECHNIQUES **9 Hours**

Yarn production systems, elastomeric yarns, core spun yarn, bi component and bi constituent yarn, SIRO yarn.

NARROW FABRICS: **9 Hours**

Introduction –fibre and yarn types, fabrics. Preparation for narrow fabric production - winding, warping, sizing, looming. Woven narrow fabrics and their constructions – structure of narrow fabrics woven on shuttleless looms. Conventional shuttle looms, unconventional shuttle looms and shuttleless looms for narrow fabrics production.

SPECIAL FABRICS AND CARPETS **9 Hours**

Elasticated fabrics, zip - fastener tapes, curtain - heading tapes, ladder tapes, trimmings, braids, labels, nets, laces, flocked fabrics. Non-pile carpet weaves and their looms. Pile surfaced carpet weaves and their looms. Needle felt floor coverings.

INDUSTRIAL TAPES AND WEBBINGS **9 Hours**

Slide fastener tapes - Insulating tapes – Book binder's tapes – Labeling Tapes – Border Tapes – Elastic- Pleated lingerie ribbing. Manufacture of spindle drive webbing – Print webbings – Webbings for automobile safety belts

Theory 45 Hours	**Total 45 Hours**

REFERENCES:

1. Jarmila Svedova ," Industrial Textiles", Elsevier Science Publishing Co in, ISBN – 0444-98754-1, New york, 1990.
2. Alexander N G," Desighing Interior Environment", Mas court Brace Covanorich Inc, Newyork, 1996.
3. Crew A H and Arahamsen H, "Carpets: Back to Front", Textile Progress, Vol.19 No.3, The Textile Institute, Mancheste,1987.
4. Turner J P, " The production and properties of narrow fabrics", Textile Progress , Vol.8 No.4, The Textile Institute Manchester, 2002
5. Sabit Adanur, "Wellington Sears Handbook of Industrial Textiles", Technomic publishing company Inc., USA, 1995
6. R H Gong and R M Wright " Fancy yarns Their manufacture and application" Woodhead Publishing Ltd, 2002, ISBN 1 85573 577 6

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U18TXE0004 **COMPUTER APPLICATIONS IN TEXTILES**

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Understand Overview of application of computers in textiles.

CO2: Discuss about various concepts of computer vision, image processing using MATLAB.

CO3: Explain about the detection of yarn and fabrics using computer vision.

CO4: Summarize about the various applications of computers in apparel industry.

CO5: Explain about the role of computers in textile design.

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CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	W													
CO2		S							M	M			M	S
CO3				M	M				M	M			M	M
CO4	W				M								W	
CO5	M													

Course Assessment methods

Direct	Indirect
1.Internal test I 2.Internal test II 3.Assignment/ Seminar/ Tutorial 4,End Semester Examination	1.Course end survey

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INTRODUCTION **9 Hours**

Overview of Applications of computers in textile production planning, process & quality, inventory control, automation of textile machinery.

INTRODUCTION TO MATLAB **9 Hours**

Basic concepts of computer vision – image, digital image, raster image, vector image.

Basic concepts of image processing – Pixels and Resolution, Aspect ratio. Image Representation – Black and White Images, Gray Scale Images, Color Images

Image Transformations - Basic Relationship between Pixels, Intensity Transformation Functions, Histogram Processing.

COMPUTER VISION TECHNIQUES FOR DETECTING YARN AND FABRIC DEFECTS **9 Hours**

Introduction, fundamentals of textile yarn, methods for detecting yarn parameters, yarn defect detection system.

Automation for fabric inspection, Fabric defect detection methods- Fabric defect detection in patterned fabrics, automated fabric defect detection.

ROLE OF COMPUTER SYSTEMS IN APPAREL INDUSTRY **9 Hours**

3D body scanning: Working principle of 3D body scanner: Layer scanning, white light pattern scanning, Image processing method. Computer aided production planning and control, application of cut planner and general sewing data (GSD), RFID application in logistics and supply chain management

ROLE OF COMPUTERS IN TEXTILE DESIGN **9 Hours**

Introduction – Role of computer technology in textile design, main computer technologies in textile design, benefits and limitations, future trends

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1.R.C. Gonzalez and R.E. Woods, ―Digital Image Processing, Third edition, Prentice Hall, 2008

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2.Jinlian Hu “Computer technology for textiles and apparel” Woodhead Publishing Limited, 1991.

3.W.K. Wong, “Applications of Computer Vision in Fashion and Textiles” Elsevier, 2018

4. M. L. Gulrajani, “Colour Measurement: Principles, Advances and Industrial Applications”, Wood head Publishing Limited, 2010

5. W.Aldrich, " CAD in Clothing and Textiles ", Blackwell Science 2nd edition, 1992

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L	T	P	J	C
3	0	0	0	3

U18TXE0005 SUSTAINABILITY IN TEXTILE MANUFACTURING AND MATERIAL

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Understand the green process methods in textiles.

CO2: Discuss about various concepts of ecofriendly chemical processing.

CO3: Explain about the quality standards and assessment of eco-textiles.

CO4: Summarize about the various organic and sustainable textiles.

CO5: Explain about the role of recycling and up cycling.

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CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M													
CO2		S							M	M			M	S
CO3				M					M	M				M
CO4	M				M			M					W	
CO5	M													

Course Assessment methods

Direct	Indirect
1.Internal test I 2.Internal test II 3.Assignment/ Seminar/ Tutorial 4,End Semester Examination	1.Course end survey

INTRODUCTION **9 hours**

Introduction: Differences between chemical & green processes, rules/recommendations for using chemicals, raw materials & waste handling for sustainable textiles & clothing.


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ECO-FRIENDLY CHEMICAL PROCESSING **9 Hours**

Eco-friendly chemical processing: Modern approaches to eco-friendly wet processing of woven and knitted clothing. Red listed textile chemicals, their sources and remedies. Eco-friendly dyes and their method of dyeing. Energy efficient production methods and processing techniques. Eco-labeling and various eco-standards, enzymes and natural dyes.

QUALITY STANDARDS AND ASSESSMENT OF ECO-TEXTILES **9 Hours**

Quality standards and assessment of Eco-textiles, Oekotex standards, GOTS standards: certification procedures and implementation, ISO 14000 & EMS: guidelines and implementation. Toxicology of textile dyes and chemicals, eco- parameters and testing of various toxic chemicals and dyes.

ORGANIC AND SUSTAINABLE TEXTILES **9 Hours**

Organic and Sustainable textiles: Organic fibre production & processes- cotton, wool silk, bamboo, Regenerated fibres- Lyocell, PLA, Recycled fibres- PET. Reduction of carbon footprints in textile processing.

IMPORTANCE OF RECYCLING AND UP CYCLING **9 Hours**

Introduction and importance of recycling and up cycling for growing source of innovative design in the fashion and accessories, processing, production and their applications, Life cycle assessment (LCA) methodology, Eco-Parameters and Testing of Sustainable Textiles and Apparels. Manufacturing rights-Ethical and environmental issues relating to textiles and fashion industry. Ethical, standard practices for sourcing of sustainable fashion clothing and accessory. Corporate social responsibility in fashion and apparel industry.

Theory: 45 Hours **Total: 45 Hours**

REFERENCES

1. Blackburn R S, „Sustainable textiles: Life cycle and environmental impact", Woodhead Publishing Ltd, UK, 2009.

2. Christie R., "Environmental aspects of textile dyeing", Woodhead Publishing Ltd, UK, 2007.

3. Moore M.A "Environmental impact of textile production, Fairchild books, New York 2008.

4. Skelly J. K., "Water Recycling in Textile wet Processing", Woodhead Publishing Ltd, UK, 2003.

5. Trivedi R.K., "Handbook of Environmental laws, Acts, Guidelines, Compliances and Standards", Vol. 1, Enviro Media, India, 1996.

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U18TXE0006 APPAREL PRODUCTION PLANNING AND CONTROL

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss various apparel production systems.
CO2: Illustrate production planning techniques in marker planning and spreading.
CO3: Illustrate production planning techniques sewing line.
CO4: Explain the concept of work study.
CO5: Apply production control techniques in garment industry.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S	M											S	
CO2	S	M											S	
CO3	S	M											S	
CO4	S	M											S	
CO5	S	M											S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

INTROCUCTION **9 Hours**

Introduction-Objectives-Production Management-Product design-Design of production system-Types of production system-Manufacturing process-Types of manufacturing process-Factors affecting the choice of manufacturing process-Production planning and control-Benefits to small entrepreneur-Steps of production planning and control- Planning & lead Time -Importance of pre-production activities.

MARKER AND LAY PLANNING **9 Hours**

Marker planning –Direction of Design-Marker utilization –spreading technique for plain – stripes, plaid and checks –splicing – marker making; lay lot planning; cutting and sewing schedule-preparation of cutting schedule-numerical exercises on lay lot planning-Types of Lay

OPERATION SEQUENCE DEVELOPMENT **9 Hours**

Garment breakdown with machine and attachment details, development of production grid for T-Shirts - development of production flowchart – men's full sleeve shirt – trousers – five-pocket jeans – ladies night dress – shorts – T-shirt


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WORK STUDY **9 Hours**

Method Study and Work Measurement -Techniques - Principles of Motion Economy – Classification to Movements - Process Flow Chart – Two-handed Process Chart, Micro-motion Study - Time Study – Definition - Steps in making a Time Study - Breaking the Job into Elements - Stop Watch Procedure. Time Study Rating, Calculation of Standard Time

PRODUCTION PLANNING AND CONTROL **9 Hours**

Production scheduling-Gantt chart preparation-Capacity calculation for cutting, sewing and finishing; determination of machine requirements for a new factory; line balancing: determination and allocation of manpower and machine for balanced production in existing plant for a given target

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. Solinger Jacob, "Apparel Manufacturing Hand Book - Analysis, Principles and Practice", Columbia Boblin Media Corp., 1988.
2. David J.Tyler, "Materials Management in Clothing Production", 2000.
3. William K.Hodson, "Maynord's Industrial Engineering Handbook", IV edition, McGraw Hill Inc., New York, 2010.
4. Herold Carr and Barbara Lathem, " The Technology of Clothing Manufacturing", II nd Edition, Blackwell Scientific Publications, London, 1988.
5. Prodip V.Mehta, "An Introduction of Quality Control for the Apparel Industry". ASQC quality Press, Marcel Dekker Inc., Newyork, 1992.
6. Managing Quality In Apparel Industry, S.K.Bhrdwaj & Pradip V Mehta. Quality is Free,Philip Crosby.
7. V.RameshBabu " Industrial Engineering in Apparel Production" Wood Head publishing India Ltd., ISBN 13:978-93-80308-17-3, 2012.

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U18TXE0007 GARMENT PROCESSING

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Outline the process flow for garment processing.

CO2: Explain the various dyeing, printing and finishing methods involved in garment processing.

CO3: Prepare the garment with different style using advanced finishing

CO4: Explain the working principle of garment processing machines.

CO5: Summarize the laundry equipment and reagents.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S	M											S	
CO2	S	M	M										S	
CO3	S				W								S	
CO4	S						W						S	
CO5	M	M											M	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

GARMENT PROCESSING **9 Hours**

Developments in garment processing and its future – Problems in garment dyeing – Remedies– Considerations and precautions to be taken for garment Dyeing – Pros and Cons of garment dyeing – Chemical preparation of garments for dyeing and printing. Use of enzymes in the preparation.

EFFECTS ON GARMENTS **9 Hours**

Wash down effects, stone wash, Enzyme wash, Bio – polishing, Acid wash, sand blasting, leather finish, rubbery touch, feather touch, peach skin finish, ION wash, mud wash, chalk wash, easy care finishes, wrinkle free and wrinkle resistant finish,


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water repellent finish, UV protective garments, Anti – microbial (or) anti – bacterial inhibition finish, silicone softeners, fire retardant finishes for garments.

GARMENT FINISHING

9 Hours

Finishing techniques, Dip process, Tumbling process, pad – dry – cure method. Stone washing machines, tumble dryer, used look finishing machines, garment finishers, hand finishers, multiform finishers, shirt finishers, pant finishers, cabinet finishers, tunnel finishers, continuous finishers.

LAUNDERING **9 Hours**

Study of laundry equipment and reagents – soaps – detergents – cleaning action of soaps, study of modern and industrial cleaning agents. Principles of laundering – stain removal – various solvents for stain removing blood, tea, rust, oil/grease etc. – different methods of washing – application of friction by hand rubbing – scribing – tumble wash

GARMENT CARE **9 Hours**

Selection of garments, need for garment care. Identification of stain – classification of soil and stains cleaning processes – Air & Wet cleaning, Stain removal, Drying, pressing, storage –protection against light, temperature, microbes, hand washable and machine washable garments– Garment care and care labeling. Use of care labels and standards / norms for care labels.

Theory: 45 Hours **Total: 45 Hours**

REFERENCES

1. Trotman.E.R."Dyeing and Chemical technology of textile fibres",B.I.Pub.,New Delhi.1994.
2. Noemia D' Souza ,Fabric Care, , New AGE International Pub.1998
3. NCUTE – Programme series, Finishing of Garments and Knits, held at Ichalkaranchi, IIT, Delhi.
4. NCUTE – Programme series, Garment Manufacturing Technology, IIT, New Delhi.
5. Harrison.P.W Garment Dyeing, , The Textile Institute Publication, Textile Progress, Vol .19 No.2,1988.
6. "Garment Wet Processing Technical Manual", AATCC/SDC, 1994.
7. Nicholas P Cheremisinoff, "Handbook of Chemical Processing Equipment, Butterworth-Heinemann 2000

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U18TXE0008 TEXTILE MARKETING AND MERCHANDISING

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Explain the Apparel Marketing and Consumer behaviour in Fashion.
CO2: Discuss the Fashion Merchandising and Merchandise planning.
CO3: Describe the Apparel Merchandising Planning and Procedures.
CO4: Explain the Retail Merchandise Plan and Visual Merchandising.
CO5: Prepare Pre-Cost sheet for garments.
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CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M	M											M	
CO2	M	M											M	
CO3	M	M											M	
CO4	M	M											M	
CO5	M	M											M	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

APPAREL MARKETING 9 Hours

Introduction to Marketing, Definition, Objectives, Marketing concepts – Fashion Marketing, scope of fashion marketing, Marketing functions, Marketing Mix – Fashion Markets, Retail, wholesale markets, Textile markets, Local and International markets -Consumer behaviour in Fashion – International Marketing.


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FASHION MERCHANDISING **9 Hours**

Types of Merchandising - Fashion merchandising, Functions and scope of fashion merchandising, Fashion Merchandising principles and techniques - Product planning and development, Product mix strategy- Fashion forecasting - Merchandise planning

APPAREL MERCHANDISING **9 Hours**

Introduction to apparel merchandising –Role of Apparel Merchandiser- Sampling procedures, types - Apparel merchandising procedures - Time and action (T&A) plan - Merchandising plan, Tech Pack, PO,BOM,Route card, Trim card,L/C ,Packing list, Cost sheet, Planning a merchandise.

RETAIL AND VISUAL MERCHANDISING **9 Hours**

Introduction to retailing - Process of retail merchandising, Role of merchandiser in retail business - Retail merchandise planning. inventory planning, Assortment planning, Model stock plan- Retailing formats - Visual merchandising, types, elements and roles.

SOURCING AND COSTING **9 Hours**

Introduction to sourcing - Sourcing decision - Sourcing in apparel industry - Factors affecting sourcing of fabric and trims - Introduction to garment costing - Steps involved in costing of garments - CMT (cost of making) cost - Trims and accessories cost - Shipment cost - Cost sheets for ladies, men and children's wear

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. V.Ramesh Babu. A.Arunraj. "Fashion Marketing Management ",Woodhead publishing,2019
2. Evans. J. R. "Marketing: Marketing In The 21st Century", 8th edition, 2003.
3. Philip Kotler, "Marketing Management", PHI publications, 2004.
4. S.Shivaramu, "Export Marketing – A practical Guide to Exporters", McGraw-Hill Book Company, 1985.
5. Ruth E.Glock and Grace L.Kunz, "Apparel manufacturing and sewn product analysis", Prentice Hall, New Jersey, 2000.
6. D. Sinha, "Export Planning and Promotion", IIM, Calcutta, 1981.
7. Tuhin K. Nandi, "Import–Export Finance", IIM, Calcutta, 1989.

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8. J.A. Jarnow, M.Guerreiro, B.Judelle, “Inside the Fashion Business”, MacMillan Publishing Company ISBN: 0-02-360000-4., 1987.
9. Ruth E.Glock, Grace I.Kunz, “Apparel Manufacturing: Sewn Product Analysis”, Pearson Education, Fourth Edition, 2005.
10. Elaine Stone, Jean A. Samples, “Fashion Merchandising”, McGraw-Hill Book Company, ISBN: 0–07–061742–2., 1985.
11. S.Shivaramu. “Export Marketing” – A Practical Guide to Exporters”, Wheeler Publishing, ISBN: 81-7544-166-6, 1996.


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U18TXE0009 CLOTHING SCIENCE

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Understand the clothing concept for wear comfort.
CO2: Estimation of thermal and moisture transmission characteristics of various fabrics and their suitability of applications.
CO3: Correlate the tactile property of the fabric with comfort to the wearer.
CO4: Design of a fabric with suitable fibre type, yarn structure, fabric structure and finishes for various garment end uses.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S												S	
CO2	S	M											S	
CO3	M	M		S									M	
CO4			S		M								M	

Direct	Indirect
1. Continuous Assessment test I 2. Continuous Assessment test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

CONCEPT OF CLOTHING **9 Hrs**

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

THERMAL MANAGEMENT IN CLOTHING **9 Hrs**

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.


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MOISTURE MANAGEMENT IN CLOTHING **9 Hrs**

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.

TACTILE ASPECTS OF COMFORT **9 Hrs**

Various aspects of prickliness and scratchiness - Measurements; Tactile sensing mechanism – Tactile characteristics of textile material – human responses – measurements: Objective evaluation of Tactile characteristics of fabric – KES and FAST systems.

GARMENT FIT AND COMFORT **9 Hrs**

Garment fit – size, fit and pressure – judgment of fit – fit sensation – challenges in fitting garment – mass production and customization – determination and prediction of pattern dimension; loose and tight fit; Dynamic interaction of garment – Tactile and pressure sensation; Functional clothing -Effect of layering of fabrics.

Theory 45 Hours	**Total: 45 Hours**

REFERENCES

1. Apurba Das and R. Alagirusamy, Science in Clothing Comfort, Wood head Publishing India Ltd., 2010.
2. N. Pan and P. Gibson, Thermal and moisture transport in fibrous materials, The Textile Institute, wood head Publishing Limited, Cambridge, England, 2006
3. Y. Li, The Science of Clothing Comfort, Textile Progress, Vol. 31, No. 1 & 2, 2001
4. Patnaik et. al., Wetting and Wicking in Fibrous Materials, Textile Progress, Vol. 38, No. 1, 2008.
5. B. P. Saville, Physical Testing of Textiles, The Textile Institute, Wood head Publishing Limited, Cambridge, 1999.
6. K. Slater, The Thermal Behaviour of Textiles, Textile Progress, Vol. 8, No. 3, 1976.
7. K. Slater, Comfort Properties of Textiles, Textile Progress, Vol. 9, No 4, 1977

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U18TXE0010 NANO AND SMART MATERIALS IN TEXTILES

L	T	P	J	C
3	0	0	0	3

Course outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Understand the principle of electro spinning**.**

CO2: Understand the Nano particle preparation and characterization.

CO3: Understand the Smart technology for textiles and clothing.

CO4: Understand the applications of intelligent polymers in biomedical

CO5: Understand the Current and future trends for wearable technology.

CO-POs & PSOs Mapping

(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M	M												
CO2		M												
CO3			M		W								M	
CO4	M						W							
CO5		M												

Course assessment Methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

NANOFIBRE PRODUCTION: 9 Hours

Principle of electrospinning. Electrospinning of nano fibres – conditions, structure formation, properties, effect of process parameters upon fibre formation. Methods to produce continuous filaments. Electrospinning of polyamides and polyesters.

NANOPARTICLES: **9 Hours**

Preparation, characterization, and application of silver nanoparticles, Fe nanoparticles ZnO, TiO2, MgO, SiO2 & Al2O3 with PP or PE coating, Indium-tin oxide Nanoparticles, Ceramic Nano-Particles, Carbon black Nanoparticles, Clay nanoparticles, Cellulose Nanowhiskers and Nanoparticles. Self- assembled nanolayer films, Nano structuring of polymers with cyclo dextrins

BASIC CONCEPTS OF SMART TEXTILES 9 Hours

Smart technology for textiles and clothing, Development of smart technology for textiles and clothing. Electrically active polymer materials-Polymer materials as actuators or artificial muscle, Peculiarity of polymer gel actuator, Triggers for actuating polymer gels, Electro-active polymer gels as artificial muscles.

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INTELLIGENT TEXTILES **9 Hours**

Tailor-made intelligent polymers for biomedical applications –Introduction, Fundamental aspects of shape memory materials, Concept of biodegradable SMP , Degradable thermoplastic elastomers having SM properties , Degradable polymer networks having SM properties.

WEARABLE TECHNOLOGY **9 Hours**

Current and future trends for wearable technology; Applications of wearable electronics and photonics; Implications of wearable technology; Electro active fabrics-Sensing fabrics, Actuating fabrics, Smart fabrics for health care, Smart fabrics for motion capture, Smart textiles as kinesthetic interfaces.

Theory 45 Hours	**Total 45 Hours**

REFERENCES:

1. Brown P J and Stevens K, "Nanofibres and Nanotechnology in Textiles", Woodhead Pub. Ltd., Cambridge, 2007.
2. Yury Gogotsi, "Nanotubes and Nanofibres", CRC Taylor & Francis, Boca Raton, 2006.
3. Guazhong Cao, "Nanostructure and Nanomaterials", Imperial College Press, USA, 2006.
4. Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simons and Burkhard Raguse, "Nanotechnology- Basic Science and Emerging Technologies", Overseas Press, New Delhi, 2005.
5. X.M.Tao, ―Smart Fibres, Fabrics and Clothing: Fundamentals and Applications‖, Woodhead Publishing Ltd., England, 2001.
6. Jinlian Hu, ―Shape Memory Polymers and Textiles‖, 1st edition, CRC, USA, 2007.

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L	T	P	J	C
3	0	0	0	3

U18TXE0011 TEXTILE COMPOSITES

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Describe the various reinforcements/resin materials used in composites with its basic testing.

CO2: Distinguish the type of reinforcements/resin materials used in composites and compare its properties with conventional engineering materials.

CO3: Analyze and interpret the necessary steps involved in textile composite formation.

CO4: Demonstrate the different composite manufacturing techniques with its limitations.

CO5: Outline the various testing performed in composite materials.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1			M		S					M			M	
CO2		M	M										M	
CO3	M	M			S					M			M	
CO4	S		M		M								M	
CO5	M	M			M					M			M	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

INTRODUCTION TO COMPOSITES 9 Hours

Composites- Introduction, Definition and classification –Structure of the matrix such as MMC, CMC and PMC. Reinforcement forms – Limitations of the conventional engineering materials such as metal, plastics and ceramics-Advantages of Composites over Conventional Engineering materials. Introduction to green composites and nano-composites.


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MATRIX AND REINFORCEMENT **9 Hours**

Matrix polymer-Thermosets, thermoplastics-Reinforcing agents-Types of reinforcing agents such as fibre, particulate and laminates-Fibre forms such as roving, yarns, fabrics. Prepregs and preforms – manufacturing technologies, advantages and Limitations.

MECHANICS OF COMPOSITES **9 Hours**

Mechanical Properties of composites. Critical Length of short fiber composites. Modulus & Ultimate failure stress of continuous fiber composites. Rule of Mixture and Property prediction-Fibre Volume fraction and Fibre Mass Fraction.

COMPOSITES MANUFACTURING METHOD **9 Hours**

Manufacturing Technologies-Spray lay-up, Sheet Moulding, Automatic Lay-up, Vacuum bagging, Compression moulding, Injection moulding, Filament winding, Pultrusion, Resin transfer moulding.

TESTING OF COMPOSITES **9 Hours**

Destructive Testing: Tensile Testing: Inplane tension test, out of plane tensile test - Compression test, interlaminar shear testing, interlaminar fracture testing, Full Fragmentation Technique. Fibre volume fraction: Matrix digestion. Non destructive test: visual, optical, ultrasonic, acoustic, radiographic, thermal.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. Chapman, Half staff “Hand book of Composites” Springer, US, 1998

2. Robert M. Jones, “Mechanics of Composite Materials” CRC Press, 1998.

3. Ravi B. Deo, Charles R. Saff “Composite Materials: Testing and Design”, ASTM International, 1996.

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U18TXE0012 BIO POLYMERS AND MEDICAL TEXTILES

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Outline on biopolymers.
CO2: Explain health care textiles.
CO3: Discuss on implant textiles
CO4: Summarize non-implantable and corporeal textiles.
CO5: Illustrate on the wound dressing and smart textiles.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M												M	
CO2	M	M											M	
CO3	M												M	
CO4	M												M	
CO5	M	M											M	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

BIOPOLYMERS **9 Hours**

Classification of biopolymers used in medicine – Natural biopolymers - properties and applications. Synthetic biopolymers - raw material, synthesis, properties, storage stability and sterilization of biopolymers. Evaluation of biopolymers - *In vitro* tests- direct contact, agar diffusion, elution methods, *In vivo* assessment of biopolymers to tissue compatibility. Concepts of antimicrobial testing in textiles.

HEALTH CARE TEXTILES **9 Hours**

Classification of medical textiles, current market scenario in international and national level – government initiatives. Operating room garments- personal health care and hygiene products and their testing methods; applications of non-wovens in medicine; textiles in infection prevention control.


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IMPLANTABLE TEXTILES **9 Hours**

Implantable textiles: hernia mesh – vascular prostheses – stents. Tissue engineering: properties and materials of scaffolds- relationship between textile architecture and cell behavior – applications of textile scaffolds in tissue engineering.

NON-IMPLANTABLE AND EXTRA CORPOREAL TEXTILES **9 Hours**

Bandages-types, properties and applications; compression garments-types, properties and applications; sutures: types and properties;

Extra corporeal materials: Cartilage nerves – liver ligaments, kidney, tendons, cornea; Drug delivery textiles: classification – mechanism various fabrication methods – characterization – applications.

WOUND DRESSING MATERIALS **9 Hours**

Wound: types and healing mechanism- textile materials for wound dressing – bio active dressing – anti microbial textiles dressing – composite dressing –- testing of wound care materials; Wound compression textiles; Reusable medical textiles: types, advantages, physical properties and performance — reusable processing methods

SMART MEDICAL TEXTILES AND LEGAL ISSUES **9 Hours**

Smart textiles – types, characteristics – smart textiles in wound care; applications of phase change and shape memory materials –mobile health monitoring; electronics in medical textiles; Smart textiles in rehabilitation and applications. legal and ethical values involved in the medical textile materials.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. Rajendran.S, "Advanced Textiles for Wound Care", Wood Head publishing in Textiles: Number 85, 2009.
2. Bartel.V.T, "Handbook of medical textiles", Wood Head publishing, 2011.
3. Van Langenhove, "Smart textiles for medicine and health care – materials, systems and applications", Wood Head publishing, 2007.
4. Ray smith, "Biodegradable polymers for industrial application", CRC press, 2005.
5. Buddy D.Ratner and Allan S. Hoffman, "Biomaterials science – An introduction to materials in medicine", Academic press, 1996.
6. Pourdegtimi..B, "Vascular grafts: Textile structures and their performance", Textile progress, vol. 15, No. 3, the Textile Institute, 1986.
7. Cusick. GE and Teresa Hopkins, "Absorbent incontinence products", the Textile Institute, 1990.
8. Kothari.V.K., "Progress in textiles: Technology developments and applications", volume 3, IAFL Publications, 2008.

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L	T	P	J	C
3	0	0	0	3

U18TXE0013 TESTING OF FUNCTIONAL AND TECHNICAL TEXTILES

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Outline the testing of functional textiles.
CO2: Explain the testing of comfort characteristics of fabric.
CO3: Discuss on moisture transmission tests.
CO4: Summarize testing of functional finishes in textiles.
CO5: Illustrate on the testing of protective textiles.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M												M	
CO2	M	M											M	
CO3	M		M			M							M	
CO4	M												M	
CO5	M	M											M	

Course Assessment methods

Direct	Indirect
1.Internal test I 2.Internal test II 3.Assignment/ Seminar/ Tutorial 4.End Semester Examination	1.Course end survey

INTRODUCTION: **9 Hours**

Objectives of Testing of Functional and Technical Textiles.

TEXTING OF COMFORT CHARACTERISTICS OF FABRIC **9 Hours**

Testing of Fabric Handle Characteristics Subjective assessment, objective assessment KESF and FAST methods Nozzle extraction principle.


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MOISTURE TRANSMISSION TESTS **9 Hours**

Testing of Transmission characteristics Moisture transmission (Vapour form and Liquid form) Thermal transmission, Testing of extreme heat, fire and cold protective clothing

TESTING OF FUNCTIONAL FINISHES IN TEXTILES **9 Hours**

Testing of extreme heat, fire and cold protective clothing, Testing of geotextiles, Testing of filter fabrics, Testing of fibre reinforced composites

TESTING OF PROTECTIVE TEXTILES **9 Hours**

Testing of electromagnetic shielding textiles, Testing of compression bandages, Testing of ballistic protective textiles, Testing of UV protective textiles, Special Testing for Nonwoven and Technical Textiles

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. Physical Testing of Textiles by B. P. Saville, 1999,Woodhead Publishing Ltd., U. K.
2. Principles of Textile Testing by J. E. Booth, 1961,Heywood Books, London
3. Testing and Quality Management – Edited by V. K.Kothari, IAFL Publications, New Delhi
4. BIS, BS, ASTM and other standard methods of textiletesting
5. Science in Clothing Comfort, Apurba Das and R.Alagirusamy, Woodhead Publishing India Ltd., 2010.
6. . K. Slater, The Thermal Behaviour of Textiles, Textile Progress, Vol. 8, No. 3, 1976.
7. K. Slater, Comfort Properties of Textiles, Textile Progress, Vol. 9, No. 4, 1977
8. . Handbook of Technical Textiles, Edited by A R Horrocksand S C Anand, The Textile Institute, CRC Press
9. . Wellington Sears Handbook of Technical Textiles, SabitAdanur, Technomic Publishing Co. Inc.
10. Handbook of fibre rope technology, H A McKenna, J WS Hearle and N O'Hear, The Textile Institute, CRC Press11. Online sources on testing of technical textiles

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U18TXE0014 TEXTILE PROJECT MANAGEMENT AND FINANCE

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Summarize about project management.
CO2: Outline on project planning.
CO3: Estimate the cost of production & working capital requirement.
CO4: Differentiate between income statement and balance statement.
CO5: Review about project financing.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	S	S											S	M
CO2	S	S											S	
CO3	M	M											M	
CO4	S	S											S	M
CO5	M	S											M	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

PROJECT MANAGEMENT **9 Hours**

Definition-Forms of project organization-Project Planning-Project control: Variance analysis and modern approach with calculation-Human aspects of project management; Prerequisites for successful project implementation- Technical analysis- Essential contents of feasibility study- Various clearances from government agencies.


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MARKET ANALYSIS AND PROJECT PLANNING **9 Hours**

Market and demand analysis: Key Steps-Secondary Information-Market survey-Characterization- Demand forecasting: Delphi and Trend Projection methods-Market planning.

Network analysis-CPM and PERT. Layout planning: Factors governing plant location-Types of layout. Calculation of machinery requirement of spinning (Spin plan).

PROJECT COSTING AND INVESTMENT CRITERIA **9 Hours**

Cost of project -Cost of production, calculations& Projections- Working capital requirement; Capital Investments: importance and types- Capital budgeting process-Investment criteria: Net present value, benefit cost ratio, internal rate of return, payback period, and accounting rate of return.

FINANCIAL ANALYSIS **9 Hours**

Contents and projections of balance sheet, profit & loss statement, cash flow statement. Break-even point; Projected cost of production of a spinning unit-Weaving unit- Textile Processing unit-Garment unit.

FINANCING OF PROJECTS **9 Hours**

Capital structure- menu of financing-equity capital-preference capital-internal accruals-Term loans: procedure, project appraisal-debentures-working capital advance-miscellaneous sources-raising venture capital, Indian Venture capital Industry-raising capital in international markets.

Theory: 45 Hours	**Total: 45 Hours**	

REFERENCES

1. Prasanna Chandra, “Project – Preparation, Appraisal and Implementation”, Tata McGraw Hill, New Delhi, 2010.
2. Prasanna Chandra, “Fundamentals of Financial Management” Tata McGraw Hill Publications, 2010.Immer, J.R., “Layout Planning Techniques”, McGraw-Hill, New York, 1950.
3. Ormerod. A, “Textile Project Management”, Textile Institute, 1992.
4. O.P.Khanna, “Industrial Engineering and management”, DhanpatRai Publications, Reprint 2004.
5. R.Kesavan, C. Elanchezhian and T. Sunder Selwyn, “Engineering economics and financial Accounting”, Laxmi publication (P) ltd., New Delhi – 2005.
6. A.Ramachandra Arayasri and V.V.Ramana Morthy, “Engineering Economics and Financial Accounting”, Tata McGrawHill Puhlishing Company Ltd., New Delhi – 2006.

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U18TXE0015 ENTREPRENEURSHIP DEVELOPMENT IN TEXTILES

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Develop knowledge on Entrepreneurship development skills.
CO2: Develop skills on production management.
CO3: Equip with the knowledge of marketing skills placement in both
CO4: Develop knowledge to setting up a garment unit.
CO5: Have knowledge of contemporary issues and modern practices.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	S	S							M				
CO2	M	S	S		M					M			M	
CO3	M	S	S											
CO4		S		S										M
CO5	M	M	M											

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

Entrepreneurship **9 Hours**

Entrepreneurship development skills – concept of small scale industry – advantages of SSI units. Classification of Garment Units: Woven – knitted – lingerie – Leather garment – sports wear – outer wear –under garments – hospital wear. Costing: Garment cost elements – cost calculations (numerical problems).

Setting up a Garment unit **9 Hours**

Study of land – Norms of SA-8000 – capital – labour – market demand – preparing a project – large scale industry – advantages over SSI – Bank assistance.

Production Management **9 Hours**

Production planning and control – production systems – material flow control – optimization of work place arrangement for higher productivity

Labour Laws Labour – Study of labour laws – factory act – labour laws – welfare measures – safety act.


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Marketing

9 Hours

Market – study of markets for raw materials and markets for finishing products – local markets – international markets. Spring /summer – Autumn /winter seasons.

Export Scenario **9 Hours**

Exports policy – trade documentation and quota policy – AEPC and its role in the garments industry. Advertising – different media – trade fare – display – exhibition – buyer – seller meet.

REFERENCES

1. R. K. Sharma, *Development Banks and Entrepreneurship Promotion in India*, Mittal Publications,
   New Delhi, 2001.
2. O. P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai Publications (p) Ltd., New
   Delhi, 1999.
3. Ruth E Glock, Grace I Kunz, *Apparel Manufacturing – Sewn Product Analysis – 3rd Edition*,
   Prentice Hall Inc., 2000.
4. Jacob Solinger, *Apparel Manufacturing Handbook – Analysis Principles and Practice*, Bobbin Blenheim Media Corp; 2nd edition (December 1988).

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U18TXE0016 INDUSTRIAL ENGINEERING FOR TEXTILE AND APPAREL INDUSTRY

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss the relationship between productivity and Apparel Engineering.
CO2: Explain the various method study techniques.
CO3: Calculate the standard time by using work measurement techniques.
CO4: Describe the Industrial Engineering concepts in apparel.
CO5: Explain how Line Balancing procedures carried out in garment industry.

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS0 2
CO1	S	M									M		S	
CO2	S	M									M		S	
CO3	S	M									M		S	
CO4	S	M									M		S	
CO5	S	M			M						M		S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

PRODUCTIVITY AND APPAREL ENGINEERING **9 Hours**

Production and Productivity-Standard of Living-Productivity Measures-Apparel Engineering-Methodology- Benefits of engineering- Tools and techniques for apparel engineering- Role of industrial engineer- Pre-production activities of a supervisor.

METHOD STUDY **9 Hours**

Definition- Recording the method- Operation Process Chart- Flow Process Chart- Flow Diagram- String Diagram- Travel chart (From – To chart)- Multiple activity chart (or) Man-


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Machine chart- Principles of motion economy- Two Handed Process Chart- Micro motion study- Study of Method Recorded- Methods improvement.

9 Hours

WORK MEASUREMENT

Definition of work measurement- Techniques of work measurement- Time study- Selecting the job- Standard allowed minute (SAM)- Rating factor- Allowances- Other methods to set time standards.

APPLICATION OF IE TECHNIQUES IN GARMENT INDUSTRY 9Hours

Capacity study- How to perform capacity study- Operator Performance-Single cycle efficiency on standard efficiency-off standard time -Global Efficiency-Follow ups- Bundle by bundle follow up-Bundle Diagnosis-Work in process (WIP)- Operation bulletin

LINE BALANCING AND OPERATOR TRAINING 9 Hours

Balancing- Steps to Balance the line- Initial Balance - Balance control (Operating a line)- Efficiency- Cycle checks- Balancing Tools- SMT (Scientific method of training)- Methodology behind SMT- Selection test- Basic Exercise- Paper Exercise- Fabric Exercise.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. V.RameshBabu " Industrial Engineering in Apparel Production" Wood Head publishing India Ltd., ISBN 13:978-93-80308-17-3, 2012.
2. Johnson Maurice "Introduction to Work Study", International Labour Organization, Geneva, 2006.
3. JaccoSolinger "Apparel Manufacturing Hand Book", Reinhold Co., 1998.
4. Juan CrloHiba "Improving working conditions and productivity in the garment industry" International Labour Organization, Geneva, 1998.
5. M.I.KHAN"Industrial Engineering"New age international, 2007
6. Kjell zondin, "Maynard's Industrial Engineering Handbook", 5th edition, Mcgraw Hill, 2001.
7. Sheth vijay, "Industrial engineering methods and practices", penram international, publishing, India, 2005.

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U18TXE0017 **SPECIALTY KNITS**

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss about the specialty fabrics
CO2: Discuss about different specialty knit structure
CO3: Explain about the manufacturing process, properties & applications 3D knitted fabric
CO4: Summarize about advancement in underwear garments.
CO5: Outline about Acoustic textiles knitted structures.

Pre-requisite: - Knitting Technology

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S	M												
CO2	S	M											M	
CO3	S	M												
CO4	S	M												
CO5	S	M											M	

Course Assessment methods

Direct
4. Continuous Assessment Test I, II 5. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc (as applicable) 6. End Semester Examination
Indirect
1. Course-end survey


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SPECIALTY FABRICS AND MACHINES (9)

The range of specialty fabrics, The production of fleecy on sinker-top machines, Fleecy interlock, Plush, The bearded needle sinker wheel machine, Sinker plush knitted on single- jersey latch needle machines, Full–density patterned plush, Cut loop ,Double sided plush, Silver in high-pile knitting and Wrap patterning.

SPECIALTY KNIT CONSTRUCTIONS / PATTERNS (9)

1/2 Cardigan ,Blister, Cable ,Float Jacquard (face) / Float Jacquard (back) ,Full Cardigan ,Full Fashion ,Intarsia (face) / Intarsia (back) ,Ladder-back Jacquard (face) / Ladder-back Jacquard (back) ,Links and Links ,Plaited Fabric ,Pointelle Jersey, Pointelle Rib ,Rack Stitch ,Rib Jacquard (face) /Rib Jacquard (back) ,Selective Transfer ,Tuck Stitch and Welts.

3D KNITTED FABRIC (9)

3D knitting technologies, 3D knitted structures, multi-axial warp knit, fully fashioned 3D fabrics, Spacer fabric, Properties and applications of 3D knitted fabrics.

ADVANCED KNITTED PRODUCTS (9)

Women‟s apparel, Functional requirements of knitted underwear, Performance evaluation of knitted underwear, Engineering of knitted underwear fabrics, Recent developments in knitted underwear fabrics and Properties of commercial knitted underwear fabrics.

KNITTED STRUCTURES FOR SOUND ABSORPTION (9)

Acoustic textiles in vehicles, Sound absorption by plain knitted structures, Engineering advanced knitted fabrics for sound absorption, Thick spacer structures, Dense spacer structures.

Theory 45 Hours	**Total: 45 Hours**

REFERENCES

1. Spencer D J , "Knitting technology", Woodhead Publishing Series, India,2011
2. Raz S , "Knitting Technology", Woodhead Publishing Limited, UK, 1991.
3. F Au K , "Advances in knitting technology", Woodhead Publishing, Hong Kong, 2001.
4. Spencer D J , "Knitting Technology", Third Edition, Textile Institute Publication, Manchester, 2001.
5. S C. Ray, “Fundamentals and Advances in Knitting Technology”, Woodhead Publishing India

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U18TXE0018	AUTOMOBILES AND FILTRATION TEXTILES	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Outline suitable textile materials and smart textile in automobiles

CO2: Discuss the various products in automobile by using textile

CO3: Acquire on textile material used for safety purposes in automobiles

CO4: Interpret the principles and role of nonwoven media in filters

CO5: Describe the filter media and various testing performed for filters

Pre-requisites: NIL

CO/PO Mapping

(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M												M	
CO2							M						M	
CO3		M											M	
CO4		M			M								M	
CO5						S							M	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

9 hrs

AUTOMOTIVE TEXTILES

Requirements for automotive textiles, design demands, different fabrics used in automotive interiors, recycling of automotive textiles – future trends in applications of textile structures in automobiles.

INTERIORS & STRUCTURES IN AUTOMOTIVES **9 hrs**

Car seats- Types of materials used as cushions. Technology for replacing polyurethane foams in car seats, 2D and 3D textile structures for load bearing applications in automobiles.

TRIMS IN AUTOMOTIVES & SMART TEXTILES **9 hrs**

Automotive materials – tire cord, filter, air bag- future applications, belt, seat cover, acoustic textiles for noise insulation; Design and development of textile reinforced

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automotive composites. Smart textiles: definition, textile sensors and actuators – heating fabrics for car interior.

FILTRATION TEXTILES

9 hrs

Theory and Principles: Filtration and Separation, Contaminants, Surface and Depth Filtration. Fabric design and selection considerations, characteristics of nonwoven filters – air laid, dry laid, wet laid, melt-spun, flash-spun, nanofiber spun webs.

VARIOUS FILTERS & ITS TESTING **9 hrs**

Industrial Air Filtration, Air Conditioning Systems, Respirators and Facemasks, Vacuum cleaners, Air purifier. Thickness, Air Permeability, Density and Bulk, Solidity and Porosity, Pore Size and Pore Structure, Strength Properties, Water Repellency and Water/Moisture Resistance, Filter Media Filtration Testing.

Theory: 45 Hours	**Total: 45 Hours**

REFERENCES

1. R. Shishoo, Textile advances in the automotive industry, Woodhead Publishing Limited, Cambridge, England- 2008
2. Walter Fung and Mike Hard Castle, Textiles in Automotive Engineering, Woodhead Publication, USA, 2001.
3. A.R. Horrocks & S.C. Anand, “Handbook of Technical Textiles”, The Textile Institute, Manchester, U.K., Woodhead Publishing Ltd., Cambridge, England, 2000.
4. Philip Brown, Christopher Cox, "Fibrous Filter Media", Woodhead Publishing Limited, UK, 2016.
5. Irwin M. Hutten, "Handbook of Nonwoven Filter Media", Elsevier, Burlington, 2008.
6.

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U18TXE0019 **GEOTEXTILES**

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Outline the classification of geotextiles, fibres used in different fabric structures and geotextile manufacturing.

CO2: Summarize the properties of geotextile materials used in different applications along with its specific functions

CO3: Analyze and interpret the necessary physical, mechanical, hydraulic, endurance and degradation properties for geotextile selection

CO4: Outline the various testing performed for Geotextiles

CO5: Appraise the various materials and required functions of significant applications

Pre-requisites :

NIL

-

CO/PO Mapping

(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M	M			M								M	
CO2													M	
CO3	M			M									M	
CO4	M	M			M								M	
CO5		M			M								M	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1. Course end survey

INTRODUCTION **9 Hrs**

History of Geotextiles – definition – classification – Fibres utilised - Essential properties of geotextiles - Fabric types and different fabric structures - Manufacturing process – installation procedures.

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GEOTEXTILE FUNCTIONS **9 Hrs**

Classifications of geotextiles Functions: separation – reinforcement - Filtration – drainage – erosion control - Soil stabilization – fluid barrier – protection, Typical properties of polymers, overview on various applications of Geotextiles.

SELECTION OF GEOTEXTILES **9 Hrs**

Introduction –Physical properties: thickness – mass per unit area - Mechanical properties: tensile properties – compressibility – seam strength – burst strength - Tear strength - puncture strength – friction – pull-out resistance - Hydraulic properties: porosity - Percentage open area (POA) - apparent opening size (AOS) - Permittivity – Transmittivity – soil retention - Endurance properties: creep and stress relaxation - Abrasion – clogging - Degradation properties: temperature – oxidation – hydrolysis - Chemical degradation – ultra violet light

TESTING OF GEOTEXTILES **9 Hrs**

Sampling of geotextiles - Deterioration of geotextiles from exposure to UV and water - Trapezoid tear strength – tensile testing by wide-width strip method - Dynamic puncture strength test – bursting strength test – fatigue test - Interface testing - Hydraulic property testing: dry sieving test method - Endurance and degradation testing: creep test – abrasion test.

REMARKABLE APPLICATIONS **9 Hrs**

Design of geotextile for road: reinforcement function design - Separation function design - geotextile layer at the soil subgrade level - materials used - Design of geotextile for embankments: functions – materials used - overall slope stability failure - Lateral spreading – embankment settlement - Design of geotextile for retaining walls - functions – materials used - Property requirement of geotextiles

Theory: 45 Hours **Total: 45 Hours**

REFERENCES

1. Senthil Kumar R, “Textiles for Industrial Applications”, CRC Press, 2014
2. Saravanan M, “Geotextile and its application to Civil Engineering – Overview”, Asian Technical Textiles, October - December 2014
3. Sanjay Kumar Shukla & Juan-Hua Yin, Taylor & Francis, “Fundamentals of Geosynthetic Engineering” UK, ISBN10 0–415–39444–9, 2006.
4. Hand book of Geosynthetics – Geosynthetics materials Association. R.W.Sarsby, “Geosynthetics in Civil Engineering”, Wood head publications Ltd., ISBN-13: 978-1-85573-607-8, 2007.
5. Khalid a Meccai & Eyad al Hussain, “Geotextiles in Transportation Applications”, Second Gulf Conference on Roads, Abu Dhabi, March 2004.
6. S.C. Anand & A.R.Horrocks, “Hand Book of Technical Textiles”, Wood head publications Ltd., ISBN 1 85573 385 4, 2000.
7. Stephen Corbet, John King, Proceedings of the Conference Geofad '92: Geotextiles in Filtration and Drainage Organized by the U. K. Chapter of the International Geotextile Society, Held at Churchill College, Cambridge, U. K.1992.

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U18TXE0021 GLOBAL LOGISTICS MANAGEMENT

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: To understand the basic framework of logistics management.

CO2: To understand role of logistics in customer services and role of information technology in logistics

CO3: To understand basic concepts of inventory management, warehouse management and material handling

CO4: To understand fundamentals of transportation and logistic network designing and to get acquainted with how the shipping industry operates.

CO5: To comprehensively learn the role of Port system in Global Logistics Operations.

Pre-requisites: NIL

CO/PO Mapping
(S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M												M	
CO2					S			S		S		M		
CO3		M	S								S		M	
CO4		S				M			M			M		
CO5			M							M			S	

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Assignment/ Seminar/ Tutorial 4. End Semester Examination	1.Course end survey

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OVERVIEW OF LOGISTICS

Nature- Concept- Evolution- Components of Logistics Management- Logistics in India- Functions- Value Chain of supply chain management- Concept of 3PLs- 4PLs- Green Logistics- Reverse Logistics- Contemporary trends in International Logistics.

INFORMATION SYSTEM AND SERVICES

Logistics Information system- Operational LIS- IT Solutions for Logistics- Emerging technologies in Logistics-Customer Service- Concept- Components-

Customer service costs- Gap Analysis for customer service measurement- customer service strategic management- Impediments to an effective customer service strategy

INVENTORY MANAGEMENT, WARE HOUSING AND MATERIAL HANDLING

Introduction, concept, types, functions of inventory in logistics. Elements of Inventory costs, Just in time system, Quick response logistics.

Warehousing- Concept, Types, Warehouse Strategies, Recent Trends.

Material Handling- Concept, Guiding Principles, Devices. Containerization- Introduction, History, classification, Container Standards, Problems. Packaging- Concept, Functions, Issues, Emerging Trends.

TRANSPORTATION, SHIPPING AND LOGISTIC NETWORK DESIGN

Transportation- Introduction, Different Modes of Transport, Importance, Elements of transportation cost, Multi Model transport.

Shipping- Liner Conference, Chartering- types and Charter Party Principles, freight Structure and Practices, Types of Ships, Inland Container Depot/ Dry Ports, Shipping and World Sea borne Trade, Recent trends in shipping Policy, Incoterms, Indian Shipping Industry

Logistics Network Design

Concept, Design options for a distribution network, Impact of distribution network design, Various distribution network.

PORT SYSTEM

Introduction, Major Ports in India, IPA, Port Community System, Traffic handled at Indian Ports, Major developments in ports, Major problems with Indian ports, Productivity of Indian ports, Policy initiatives for development of ports, Dredging policy, AISC, Maritime Fraud, International Maritime bureau.

References

1. Logistics Management for International Business- Text and cases, Sudalaimuthu and Anthony Raj, PHI, 2009 Edition
2. Global Operations and Logistics- Text and cases, By Dornier, Ernst and Fender, Wiley India, 2006 Edition
3. Supply Chain Logistics Management, By Bowersox D and Closs D, PHI, New edition
4. Business Logistics Management, by R. H. Ballou, PHI, 2004 Edition Logistics Management, by V. V. Sople, Pearson education, New edition

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U18TXE0022 **INNOVATION PRACTICES FOR PRODUCT DEVELOPMENT**

L	T	P	J	C
0	0	3	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Formulate a critical and logical textile applied study in a vivid manner

CO2: Demonstrate the implied analysis/research in the above defined study

CO3: Experiment the defined variables using suitable statistical tools.

CO4: Analyze and conclude the implied and aimed inferences and relationships in the above experiment/research

CO5: Discuss and explain the outcomes of the research/analytical study.

Student should undertake in depth literature study of a subject of outside the regular courses offered in the programme. The study should be carried out under the guidance of a faculty member. The Subject area chosen by the student should be Industry Problem statements. Student must submit the detailed plan of work to the faculty coordinator before one week from the last instruction day of previous semester. The evaluation will be based on the seminars (3 nos.) presented before review committee and its coordinator during the semester and report submitted as well as viva-voce presented at the end of the Semester before internal valuators.

Content

1. Reengineering, development and analysis of yarn, fabric samples and selected textile products using TIFAC-CORE /Textile and Fashion Dept Labs for Textile product development.
2. Preparing a project report and a report highlighting the specifications of the product and standards.
3. Comparison with commercial products.
4. Consolidated project report preparation.

The valuation pattern is as follows.

Particulars	Maximum Marks	Minimum Marks
CAM	60	0
End Semester Valuation (Project Report & Viva Voce)	100	50
Total	100	50

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U18TXE0023 FASHION MARKETING MANAGEMENT

L	T	P	J	C
3	0	0	0	3

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Summarize the fashion revaluation and marketing
CO2: Discover the functions of fashion merchandising
CO3: Discuss the concept of Apparel merchandising.
CO4: Analyze the retail and visual merchandising
CO5: Explain the fabric souring method and estimate the garment costing.

FASHION BUSINESS AND APPAREL MARKETING **9 Hours**

Fashion Business-Fashion cycle-Dynamics of fashion-Factors influencing fashion movement-Classification of Textile and Apparel Industry-Introduction to Marketing - Fashion Marketing-Fashion Markets-Consumer Behavior in Fashion.

FASHION MERCHANDISING **9 Hours**

Types of merchandising-Fashion Merchandising – Scope and Functions- Fashion merchandising principles and techniques- Product Planning and development-Product Mix Strategy-Fashion Forecasting-Merchandise Planning.

APPAREL MERCHANDISING **9 Hours**

Introduction to Apparel Merchandising-Sampling-Types of samples-Merchandiser roles-Apparel Merchandising Procedures-Time and action (T&A) plan -Merchandising plan-Tech Pack-Trim card-Bill of material-Planning of Merchandise.

RETAIL AND VISUAL MERCHANDISING **9 Hours**

Introduction to Retailing-Process of Retail Merchandising-Role of Retail Merchandiser-Retail Merchandise Planning-Assortment Planning-Retail Merchandise Planning-Model Stock Plan-Retailing Formats-Visual Merchandising

SOURCING AND GARMENT COSTING **9 Hours**

Introduction to Sourcing-Sourcing Decision-Sourcing in Apparel Industry-Factors affecting sourcing of fabric and trims-Introduction to Garment Costing-Fabric cost-CMT (Cost of Making) Cost-Trims and Accessories Cost-Shipment Cost-Cost sheets for Ladies, Men, Children's wear.

Total: 45 Hours

REFERENCES

1. Grace, E (1978), Introduction to fashion merchandising, Prentice Hall, New Jersey.

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2. Kotler, P and Armstrong, G (1999), Principles of marketing, Prentice Hall of India, New Delhi.
3. Jackson, T (2001), Mastering fashion and merchandising management, Mc Millan Press, London.
4. Donnellan J (2002) Merchandise buying and management. New York, Fairchild Publications, Inc.
5. Glock R E and Kunz G I (2005) Apparel manufacturing. 4th ed. New Jersey, Prentice Hall.
6. Stone E, Samples J A (1985), Fashion merchandising, McGraw-Hill Book Company.
7. Rath P M, Peterson J, Greensley P and Gill P (1994), Introduction to fashion merchandising, Delmar Publishers Inc., New York.
8. Frings G S (1999), Fashion – from concept to consumer, Prentice Hall, New Jersey.
9. Phillips P M (1996), Fashion sales promotion, 2nd ed., Prentice Hall Inc.,New Jersey.
10. Diamond E (2006), Fashion retailing – A multi-channel approach (2nd Edition), New Jersey, Prentice Hall Inc.
11. Pegler M M (2001), Visual merchandising and display (4th Edition), New York, Fairchild Publications.
12. Curtis E (2004), Fashion retail, England, John Wiley and Sons Ltd.
13. Ramesh Babu V and Arunraj A (2019), Fashion Marketing and Merchandising, Woodhead Publishing, India.

The valuation pattern is as follows.

Particulars	Maximum Marks	Minimum Marks
CAM	60	0
End Semester Valuation (Presentation by internal evaluation)	100	50
Total	100	50

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ONE CREDIT COURSE


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U18TXC001 **WORK STUDY IN SEWING LINE**

L	T	P	J
1	0	0	0

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Describe the basic techniques and procedures of work study.

CO2: Apply the Method study and Motion analysis for various garment manufacturing.

CO3: Calculate the SAM for different styles.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S				S									
CO2	M			S										
CO3		S												

Course Assessment methods

Direct	Indirect
1. Examination	1. Course end survey

WORK STUDY: Procedure, techniques.

METHOD STUDY: Applications for a basic garment style – case studies from different garment styles.

MOTION ANALYSIS: Applications for a basic garment style – case studies from different garment styles.

MICRO MOTION ANALYSIS: Applications for a basic garment style - case studies from different garment styles.

WORK MEASUREMENT: Calculation of standard allowable minutes (SAM) for a basic garment style using time study, PMTS, work sampling and standard data techniques. Case studies from different garment styles.

Theory 15 Hours **Total: 15 Hours**

REFERENCES

1. George Kanawaty, ILO, "Introduction to Work study", Universal Publishing Corporation, Mumbai, 2005.
2. Chuter A J "Introduction to Clothing Production Management", Blackwell Publishing, Oxford, UK, 2007.
3. Jacob Solinger, "Apparel Manufacturing Handbook, Analysis, Principles and Practice" Boblin Media Corp, Columbia, 2000.
4. Ruth E Glock, Grace I Kunz, "Apparel manufacturing – Sewn production Analysis", Prentice hall Inc, New Delhi, 2000.

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5. Kiell B.Zandin, “Maynard’s “Industrial Engineering Hand Book”,Mc Graw Hill, Inc. New York, 2001
6. Ralph M Barnes, “Motion and Time Study Design and Measurement of Work”,John Wiley & Sons, New York, 1992
7. V.Ramesh babu, “Industrial engineering in apparel production”, Woodhead publishing India Pvt Ltd, New Delhi 2011. 71

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U18TXC002 **RETAIL MANAGEMENT**

L	T	P	J	C
1	0	0	0	1

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Discuss on retail marketing, retail markets in India, franchising and recent trends in retailing.

CO2: Explain the merchandise management, location strategy, logistics, SCM and Retail operations.

CO3: Classify the types of retail formats and suitable visual merchandising techniques in Mall management.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M				S									
CO2	M	M					S							
CO3		M												

Course Assessment methods

Direct	Indirect
1. Examination	1. Course end survey

MARKETING: Retailing – Role, relevance & trends, Retail customer, Retail Market Segmentation & franchising, Retail in India, advertising & sales promotion.

RETAIL OPERATIONS: Retail location strategy, product and Merchandise management, EDP/MIS, Logistics & SCM, Security measures, Footfalls / computerized methods & non computerized methods, Merchandising & Management - Fashion designing.

MALL MANAGEMENT : Types of various retail formats, concepts in mall design, Store layout and Visual merchandising, factors influencing malls establishment, Visual / display methods.

Theory 15 Hours **Total: 15 Hours**

REFERENCES

1. Chetan Bajaj, Rajnish tuli , “Retail Management”, Oxford University Press, 2005.
2. Ellen Diamond, “Fashion Retailing: Multi Channel Approach”, Prentice Hall, 2006.
3. James B Ayers, Mary, Ann Odegaard , “Retail Supply Chain Management”, Auer Bach Publishers,USA, 2008.

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U18TXC003 **FANCY YARNS**

L	T	P	J	C
1	0	0	0	1

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Classify the various types of fancy yarns with their applications.

CO2: Describe the production methods for manufacturing various fancy yarns.

CO3: Explain the various factors influencing fancy effects.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M	M											
CO3		M		M										

Course Assessment methods

Direct	Indirect
1. Examination	1. Course end survey

Characteristics features, technology of production and end uses of: Slub Yarns – Crimp Yarn – Diamond Yarn – Boucle Yarn – Loop Yarn – Snarl Yarn – Mock Chenille Yarn – Knop Yarn – Stripe Yarn – Grandrelle yarn – Neppy yarn or Flaggy yarn – Button Yarn – Fasciated yarn – melange yarn. Production Methods for the manufacturing of fancy yarns – Production of Fancy yarns in short staple spinning systems – Factors influencing the fancy effects. Applications: Manufacturing of apparel fabric & home furnishing using fancy yarns.

Theory 15 Hours **Total: 15 Hours**

REFERENCES

1. R. H. Gong and R. M. Wright,Fancy yarns – Their manufactures and applications , Wood head Publishing Limited, 2002

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U18TXC004 **ERECTION AND COMMISSIONING OF TEXTILE MACHINERY**

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Explain the various steps in erection of machineries

CO2: Calculate the manpower and space requirements with respect to the layout

CO3: Elaborate the training procedures of operators and maintenance persons

Pre-requisite : Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S	M												
CO2		M		M										
CO3					S									

Course Assessment methods

Direct	Indirect
1. Examination	1. Course end survey

Floor levelling using U tube water level – Machine case handling while shiftingmachines – packing list and physical stock verification – arranging components for erection – storing sensitive and expensive components – work table arrangement – special tools – provisions for power and pneumatic lines – manpower: skilled and un- skilled manpower requirement – machine layout line marking – positioning the base machine – machine levelling – erection sequence – erection schedule – trial run – commissioning procedure – training to operators & maintenance personnel – reports andsign off.

Theory 15 Hours **Total: 15 Hours**

REFERENCES

1. LMW erection manuals and handouts

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U18TXC005	WORKLOAD AND WORK ASSIGNMENTS	L	T	P	J	C
		1	0	0	0	1

Course Outcomes (COs)

After successful completion of this course, the students should be able to

CO1: Define work load and work assignments

CO2: Assign the workload in spinning, weaving, chemical processing, knitting and garment industries.

CO3: Calculate the productivity in spinning, weaving and chemical processing

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M													
CO2		M												
CO3		M		M										

Course Assessment methods

Direct	Indirect
1. Examination	1. Course end survey

Definitions of Workload and Work assignment – multi-machine work assignment – interference.

Workloads and assignments in Spinning, Weaving, Chemical Processing, Knitting and Garment industries – Factors influencing work assignments – measures for increasing productivity. Calculation of Productivity Measures in Spinning, Weaving and Chemical Processing.

Theory 15 Hours **Total: 15 Hours**

REFERENCES

1. T. V. Ratnam et al, SITRA Norms for Spinning Mills, The South India Textile Research Association, Coimbatore, 2004.

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U18TXC006 **ERP IN TEXTILES**

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Discuss the importance, merits, demerits and limitations of ERP.

CO2: Explain the various modules in ERP.

CO3: Describe the implementation methods of ERP and training procedures.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M												
CO3		M		M										

Course Assessment methods

Direct	Indirect
1. Examination	1. Course end survey

Fundamentals – Definitions and overview of ERP – advantages and limitations of ERP; Modules Major features, reports and uses of the ERP Modules with special focus on textile enterprises: Production Management, Quality Management, Plant Maintenance, Materials Management, Human Resources, Sales and Marketing, Finance and Accounting. Implementation – ERP implementation cycle – team training, testing, going live, end-user training, post implementation; in-house implementation – pros and cons; faster implementation methodologies; future directions in ERP; issues in implementation and solutions for textile industry.

Theory 15 Hours **Total: 15 Hours**

REFERENCES

1. Mahadeo Jaiswal and Ganesh Vanapalli, Textbook of Enterprise Resource Planning (ERP), Macmillan Publishers India, 2005.
2. L. M. Applegate, R. D. Austin and F. W. McFarlan, Creating Business Advantage in the
3. Information Age. New York: McGraw-Hill, 2002.
4. E. Monk and B. Wagner,Concepts in Enterprise Resource Planning (2nd ed.), Thomson Course Technology, Boston, 2006.
5. D. L. Olson, Managerial Issues of Enterprise Resource Planning Systems, New York: McGraw- Hill, 2004.
6. K. Sandoe, G. Corbitt and R. Boykin, Enterprise integration,Hoboken, NJ: John Wiley & Sons Inc., 2001

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U18TXC007 EXPORT DOCUMENTATION

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: List out various export documents and their importance.

CO2: Discuss on pre-shipment and post shipment documents.

CO3: Describe the various terms of payment in international marketing.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
1. Examination	1. Course end survey

Export credit – Short term – Medium term – Long term – Anticipatory letter of credit – Packing Credit – Negotiation of bills – Terms of payment in international marketing. Export Documents: International codes for products and services – Principal documents – Auxiliary documents – Documents for claiming export assistance.

Theory 15 Hours **Total: 15 Hours**

REFERENCES

1. V. R. Sampath, R. Perumalraj and M. Vijayan, Apparel Marketing and Merchandising, Kalaiselvam Pathippakam, Coimbatore, 2007.

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U18TXC008 FASHION BRAND MANAGEMENT

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: List out various export documents and their importance.

CO2: Discuss on pre-shipment and post shipment documents.

CO3: Describe the various terms of payment in international marketing.

Pre-requisite : Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Fashion Brand Management Types and relevance of branding, Fashion & brand positioning, launching strategies, distribution, marketing campaigns for brand introduction. Making of a strong brand: Branding challenges and opportunities; Brand Building: Brand Elements: Pricing strategy; Integrated Marketing communications; Qualitative and Quantitative research techniques.

Retail brands, private brands, Retailing in India, Key Features in Indian retail brand building, Future of retail branding – Indian scenario and global scenario. Display and Space Management, Impact of information technology in retailing, Electronic retailing - Role of web, online retailing.

Theory 15 Hours **Total: 15 Hours**

REFERENCES

1. Byoungho Jin “Fashion Branding and Communication”, Palgrave Studies in Practice, ISBN 978-1-137-52342-6

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U18TXC009 WEFT KNITTED FABRIC ANALYSIS AND CALCULATIONS

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: List out various quality requisites of hosiery yarn , terminologies of weft knitting

CO2: Discuss various weft knit structures and understand the knit fabric analysis

CO3: Describe the various terms and calculation involved in weft knitting

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Content

1. Quality prerequisites for hosiery yarn
2. Weft knitting terminologies
3. Effect of machine and material parameters on weft knitted fabric quality.
4. Practical learning of weft knit fabric analysis.
5. Study of single jersey derivative structures
6. Weft knitting calculations pertaining to GSM
7. Weft knitting calculations pertaining to spandex % and production
8. Practical issues faced during fabric sampling and bulk production
9. Weft knitting yarn to finished fabric process route
10. Fabric faults, causes, remedies and the impact of faults in garment manufacture
11. Technical Applications of Weft Knit Structures

TEXT BOOKS:

1. Anbumani N., Knitting-Fundamentals, Machines, Structures and Developments, New Age International Publishers, 2007.
2. Ajgaonkar D.B., Knitting Technology, Universal Publishing Corporation, Mumbai, 1998.
3. Andrea Wynne, The Motivate Series – Textiles, Page: 137 - 164, Macmillan Education, 1997.

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4. Peter Lord, Trevor Rhodes, Mansour.H.Mohamed, Fabric Forming Systems, Noyes Publications, 1982.

REFERENCES:

1. Spencer D.J., Knitting Technology: A Comprehensive Hand book and Practical Guide, Woodhead Publishing Limited, England, 3rd Edition, 2001.
2. Sadhan. C. Ray, Fundamentals and Advances in Knitting Technology, WPI India, 2012.
3. Chandrasekhar Iyer, Bernd Mammel, Wolfgang Schach, Circular Knitting: Technology, Process, Structures, Yarns, Quality, Meisenbach, 1992.

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U18TXC010 **IOT AND APPLICATION IN SPINNING MILL**

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: List out various modular set up for spinning mill

CO2: Discuss various hardware and software requirement for IoT set up for spinning mill

CO3: Describe the various security requirements for IoT in spinning mill.

Pre-requisite : Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Modular set up for spinning mill: Requirement of modular, Mill configuration, Spinners guide, Market information, Ordering and Management, condition monitoring with alarm instructions, Intelligent digital maintenance, Production data and storage, Mill monitoring system, Man machine interface, Manual data acquisition. (5 Hours)

Hardware requirements : Server, Network, Power with UPS backup, Firewall for security, TV Wall board and Scroll Board, Wall board and its applications, Sensors for Health Monitoring Machine, Conversion kit for Legacy machines (3 Hours)

Software requirements: Operating System, Database – i. Relational ii. No SQL, Development Technology, Business Intelligence tool, Data Analysis tools (2 Hours)

Security requirements: Entry Point Protection with Firewall (UTM), Login based User privilege, SSL Certificate for the web, Restful API for inter software communication with authentication, Encryption and Decryption of data when communicated. (5 hours)

REFERENCES:

1. Spider web from Rieter
2. Rieter Essentials

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L	T	P	J	C
1	0	0	0	1

U18TXC011 UNCONVENTIONAL/SMART/MULTIFUNCTIONAL TEXTILE FINISHING

Course Outcomes

After successful completion of this course, the students should be able to

CO1: List out various Textile finishing

CO2: Discuss various assessment methods of textile finishing

CO3: Describe the method of costing of finished fabric.

Pre-requisite : Nil

CO-POs & PSOs Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Fundamentals of textile finishing: Chemistry, Durability, Health care and hygiene (5 Hours)
Finishes- Functional finishes – Assessment method (5 hours)
Costing with real examples (5 hours)

REFERENCES

1. Shenai, V.A., “Technology of Textile Finishing”, Sevak Publications, Bombay, 1995.
2. Marsh, J.T., “An Introduction to Textile Finishing”, Chapman and Hall Ltd., London, 1979.
3. W.D.Schindler and P.J.Hauser, Chemical finishing of Textiles, CRC Pr LIC Publication, 2004.
4. Charles Tomasino, Chemistry and Technology of Fabric Preparation and Finishing, Department of Textile Engineering, Chemistry and Science College of Textiles, North Carolina State University, 1992
5. Heywood, “Textile Finishing”, Woodhead Publishing Limited, 2003.

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U18TXC012 INDUSTRIAL ENGINEERING TECHNIQUES

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: List out various concepts and application of IE techniques

CO2: Discuss various assessment methods in IE

CO3: Describe the method production planning and control

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Introduction to Industrial Engineering Concepts & Application of Industrial Engineering in Apparel Industry:Basic Concepts in Industrial Engineering/Production – Productivity – Efficiency -Lead time – Standard Time – Takt Time – CPM – MMR – NPT – Work-Station Layout

Application of Industrial Engineering in Apparel Industry: Method Standardization - Bottleneck Management - Line Balancing - Operation Bulletin – Skill Matrix

Application of SMED in Style Change Over:Setup Time - Internal Activity - External Activity - Machine time - Batch setting time – Demonstration time - Time delay due to operators - Rundown time & Run uptime.

Application of Industrial Engineering in Production Planning & Control: Learning Curve – Capacity Utilization – Factory Capacity Planning

Problem Solving Techniques: PDCA Cycle – 5 Why Analysis – Herringbone Diagram – Daily works Management – Visual Display Management

REFERENCES

1. V.RameshBabu " Industrial Engineering in Apparel Production" Wood Head publishing India Ltd., ISBN 13:978-93-80308-17-3, 2012.
2. Johnson Maurice "Introduction to Work Study", International Labour Organization, Geneva, 2006.
3. JaccoSolinger "Apparel Manufacturing Hand Book", Reinhold Co., 1998.

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U18TXC013 **VALUE STREAM MAPPING**

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Discuss various concepts of lean management.

CO2: Discuss about value stream mapping and applications.

CO3: Discuss on future state of value stream mapping

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Basics of Lean Management: lean management, value in Lean, 7 waste of Lean, different types of Times - Lead Time, Cycle Time, Process time & Value added Time .

Lean Management Principles: Identification of Value, Value Stream Mapping, Create Continuous work flow, Create Pull system , Continuous Improvement

Value stream Mapping definitions (VSM): History of Value stream Mapping: Purpose of VSM, benefits of VSM Business Process Value Stream, Manufacturing Process Value stream,

Current State Value Stream Mapping : Define VSM Purpose and expectations, Visualize the key stages of your work flow, Performing Value stream Analysis

Future State Value Stream Mapping: Identify the Opportunity of Improvement, The Process elimination, Performing Future State Value stream

REFERENCES

1. Klaus Erlach “Value Stream Design The Way Towards a Lean Factory”, Springer,

ISBN: 9783642125683, 2012

2. Peter L. King, ”Value Stream Mapping for the Process Industries”, CRC press, 2015

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L	T	P	J	C
1	0	0	0	1

U18TXC014 FILTERS AND FILTRATION

TEXTILES

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Discuss the raw materials and its characteristics of filters.

CO2: Discuss about structure and application of geo textiles.

CO3: Discuss the hygiene products and medical application of textiles.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Filtration principles and materials for filter media: Filtration principles- Filtration and Separation, Contaminants, Surface and Depth Filtration. Filtration Mechanisms, Filtration Theory, Particle Filtration, Practical implications, Woven Filter Fabric design and selection considerations, Structure of Fibrous Filters.

Raw materials for filter media: Woven Filter media- Yarn types, Yarn combinations, Fabric constructions and properties. Finishing Treatment. Nonwoven Filter Media-Polymers, Fibers, Resins and Binders, Additives and Finishes. Materials for Membrane.

Processes and characteristics of filter media: Processes for Nonwoven Filter Media-Dry Formed, Meltspun Webs, Electrospun Webs, Centrifugal Spinning, Solution Spun Webs, Wet Lay Process, Composite Structures, the Pleating Process, Membranes.

Characteristics of nonwoven filter media- Air Laid Webs, Dry Laid Webs, Melt-spun Webs, Flash-spun Webs, Nanofiber Spun Webs, Wet Laid Webs, Electret Filter Media, Composite Structures, Coalescing Media, Sorption Media, Antimicrobial Media, Catalytic Media, Membrane Filter Media.

Air and liquid filters applications: Air Filters-Industrial Air Filtration, Heat Ventilation and Air Conditioning Systems, High Efficiency Air Filtration, Gas Turbine Air Intake Filters, Respirators,


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Gas Masks, and Facemasks, Vacuum cleaners, Air purifiers. Liquid Filters- Nonwoven Filter Media for Liquid Filter Applications, Testing of Liquid Filters, Membrane Filtration

Engine filtration, testing and standards for filter media: Engine Filtration-Lube Oil Filtration, Air Intake Filtration, Cabin Air Filtration, Fuel Filtration.

Testing of filter media-Basis Weight , Volatiles and Moisture Content , Formaldehyde Content, Thickness, Air Permeability, Density and Bulk, Solidity and Porosity, Pore Size and Pore Structure, Other Techniques for Measuring Porosity, Pore Size, and Structure, Strength Properties, Water Repellency and Water/Moisture Resistance, Flammability, Color, Filter Media Filtration Testing. INDA – EDANA Harmonized Test Methods.

REFERENCES:

1. Philip Brown and Christopher Cox, “Fibrous Filter Media”, Woodhead Publishing Limited, Cambridge, 2016.
2. Irwin M. Hutten, “Handbook of Nonwoven Filter Media”, Butterworth-Heinemann, Elsevier, Burlington, 2015.
3. Ken Sutherland, “Filters and Filtration Handbook”, Butterworth-Heinemann, Elsevier, Burlington, 2008.
4. Bipin Kumar, “Textiles for Advanced Applications”, IntechOpen Limited, UK, 2017.
5. Horrocks A R and Anand S C, “Handbook of Technical Textiles”, Woodhead publication and Textile Institute, England, 2000.

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L	T	P	J	C
1	0	0	0	1

U18TXC015 TECHNOLOGY OF LONG FIBER SPINNING

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Discuss the concepts of worsted /semi-worsted/woolen spinning

CO2: Discuss about jute and flax spinning.

CO3: Discuss the Bulked yarn production with long fibre.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Worsted /semi-worsted/Woolen spinning: Details of process flow of woollen, semi-worsted and worsted spinning systems-- Wool fibre shearing- Characterization and grading of wool fibre-- Principles of opening, cleaning, carding, drawing, combing, roving frame and spinning of wool and long fibres - Woolen spinning for coarse yarns-- Basic difference with cotton system.

Technology for extra-long delicate fibres: Circular combing- Modern mule spinning system for delicate extra-long fibres.

Jute and Flax Spinning: Grading of jute fibres-- Process sequence of flax and jute spinning-- Opening (hackling), carding, gill drawing, spinning of jute and flax yarns.

Tow to top conversion for long spinning: Requirements - Process sequence of tow to topconversion - Details of methods of tow to top conversion.

Bulked yarn production with long fibre: Methods of manufacturing bulked yarns - Impact of different process parameters (temperature, stretch ratio etc)

REFERENCES:

1. Lawrence C A “Advances In Yarn Spinning Technology”, Woodhead Publishing Ltd, ISBN: 9781845694449, 2010.

2. Priestman,”Principles of Worsted Spinning”, Nabu Press, ISBN: 9781172084302, 2012.

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U18TXC016 RECYCLING IN TEXTILES

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Discuss about waste generation in textile production processes.

CO2: Discuss about mechanical and chemical recycling of textiles.

CO3: Discuss the product development and marketing of recycled textiles.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Waste generation in textile production processes - India & Global scenario, Type of textile wastes, Types of recycling, Global Market share of Recycled fibres, problems associated with waste recycling, Impact of textile waste on pollution.

Mechanical recycling of textiles: Process, machinery, Technology of yarn and fabric development from mechanically recycled fibres, limitations, cost of recycling, recycled product applications, scope for sustainable product development.

Chemical Recycling of Textiles: Manmade Cellulosic Recycled fibres: Patented technologies - Infinited fibre company, Renewcell, ioncell, worn again technologies, Lenzing Refibra, Birla Liva Reviva; limitations of process, Global Market share, Brands endorsement, Consumer insights.
Recycled Polyester: Process, machinery, applications, Water & Energy savings, Global market share, applications, brands endorsement
Other fibres: Recycled Nylon, Recycled PP, etc...

Sustainable Textile Production: Environmental impact of textile production process, Sustainable measurement from cradle to grave, Higg's index, SCAP calculator, Innovations in sustainable textile production, Brands intiatives in sustainable textile production

Product Development and Marketing of Recycled Textiles: Product development from Recycled fibres: yarns, fabrics, garments and nonwovens; Process optimization of Recycled fibre production process-Marketing strategy of Recycled fibre based textiles, SWOT analysis, Government schemes to boost sustainable production methods, Branding strategies for Export markets.

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REFERENCES:

1. Pintu Pandit “Recycling waste in fashion and textiles” , Scrivener Publishing , John Wiley & Sons, 2020, ISBN 978-1-119-62049-5

2. Richard Blackburn “Sustainable Apparel Production, Processing and Recycling” Woodhead Publishing Limited, ISBN: 978-1-78242-339-3

3. A .Richard Horrocks “Recycling Textile and Plastic Waste” Woodhead Publishing Limited, 1996, ISBN 978-1-85573-306-0

4. Youjiang Wang “Recycling in textiles”, Woodhead Publishing Limited, 2006, ISBN-13: 978-1-85573-952-9

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U18TXC017 LEAN MANUFACTURING

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Discuss about lean six sigma processes.

CO2: Discuss about single piece flow.

CO3: Discuss the Pull system and Push system.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	S	M			M									
CO2	S	M												
CO3	S													

Course Assessment methods

Direct	Indirect
Examination	Course end survey

Lean Manufacturing- Principles of lean manufacturing- Basic elements of lean manufacturing- Lean manufacturing tools- Primary tools and Secondary tools of lean manufacturing.

Lean six sigma- Definition, Concept, Principles, Techniques and Benefits. Single piece flow– One piece flow manufacturing – Continuous improvement. TQM- Introduction, Definition, Concept, Principles and Tools.

5s- Sort, Set in order, Shine, Standardize, Sustain and implementation. Kanban – 6 rules, Principles, Kanban formula used in apparel industry and Kanban board- Applications. Kaizen – Definition, Elements and Benefits.

Just in Time (JIT) -Tools and Benefits. SMED (Single minute exchange of die) – Quick changeover tool- non-value added- concept- Benefits. Pull system and Push system – Strategy.

7 wastages - Overproduction, Inventory, Defects, Motion, Overprocessing, Waiting, Transportation. PCDA (Plan, Do, Check, Act) - PCDA Cycle / shewhart cycle. Problem Solving- Thumb rules, 5 Why Analyses and Fish Bone Diagram.

REFERENCES:

1.Lonnie Wilson “How To Implement Lean Manufacturing”, McGraw-Hill Education 2009

2. Dennis P. Hobbs, “Lean Manufacturing Implementation”, J. Ross Pub.2004, ISBN: 9781932159141

3. Karmen Pažek, “Lean Manufacturing”, IntechOpen, 2021 ISBN: 9781839691492

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U18TXC018 COTTON FROM FARM TO INDUSTRY

L	T	P	J	C
1	0	0	0	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Discuss about ginning.

CO2: Discuss about export import possibilities for cotton.

CO3: Discuss the Impact of Cotton on the Textile Processes.

Pre-requisite : Nil

CO-POs & PSOs Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	M												
CO2		M								M				
CO3		M								M				

Course Assessment methods

Direct	Indirect
Examination	Course end survey

UNIT 1 Introduction – Cotton overview

Introduction to Cotton- A historical perspective, Cotton Varieties as it existed before hybridization, Cotton grown around the globe

Economic Importance - Cotton: Major importing and exporting countries, Volumes, Future trends On-line sampling. Barcode generation, Impact of Ageing: Seasonal variation, Sunlight, Rain, Other severe exposure, Organic Cotton, Cotton development program under National Food Security Mission (NFSM),

UNIT 2 Buying

Direct Buying, Telangana/ Ginners/ ITF/Bulk purchase, Mills have Ginning factories/Contract Ginning/ QA team, Direct Buying, Why can't farmers sell directly to Mills always? Agency Buying Concept & Procedures, Agency Buying, GST treatment, Contracts & Obligations, Cancellations Institutional Buying- CCI, Concept of APMC- Market Yard/ Auction/ Procurement centres, MSP Concept/ Basis, FAQ, eNAM, CCI- Ginning & Storage of cotton, Contracts, Quality norms, Out-turn, Commercial Purchase, Institutional Buying- CCI (contd.), Sale of Cotton, loose lint, Contracts & Obligations (storing & lifting), New registrations, Buyers reselling to CCI, Bulk discount scheme Price fixation by CCI, CCI like entity in TN, Operation mode of CCI, Loan from bank

Exports and Imports - GATT, TFA (WTO), Procedure for Import, Trading Company, FTA, FTP 2015-20, IEC, Legal compliance, Import License, Bill of Entry- Clearance, EDI, Pass out Order, Import, Flow chart, Countries and varieties of Import, quantum, Policy changes over last 10 years- Import Duty, Export

Indian Chamber of Commerce- NP & Origin Certificate, Procedure- BoL, Invoice, Packing list, etc Cotton Export Statistics, CCI Exports

Organisations/ Institutions Roles in Cotton

SIMA, Texprocil Cotton Textile Export Promotion council, CAI – Cotton Association of India Textile Committee, AEPC, ICAR-CICR, ICAR-CIRCOT, CITI-CDRA

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UNIT 3 Testing

Traditional Measurement Techniques- Baer Sorter, Fibre Properties- Length, 2.5 % SL, Mean Length, Fibre Properties and testing principles - Strength, Fineness, Maturity, Reflectance & Yellowness, Trash, Neps, Indices- FQI, YQI, Instruments to measure, LVI & HVI, How to read a Test Report?, Interpretation of Test Results, Effect of Conditioning, Hysteresis & Moisture Content, Laboratory Equipment, Traceability & Reliability
Bremen Round Trial Participation, Selection of Equipment Carrying to the field

Cotton Testing Instruments
USTER, Premier, MAG and STATEX

UNIT 4 Expectation & Impact of Cotton on the Textile Processes

Expectations of Weaving Yarn, Knitting Yarn and blends. Requirements for OE Spinning and Specialty Applications, Home Textiles, Spinning Preparatory- Impact of Fibre quality, BR, & Card, Spinning Preparatory- Impact if Fibre quality, Combing, Drawing & Roving

UNIT 5 Marketing / Hedging

Cotton Marketing Strategies, Price Contingency Plan, Protect from downward, provision for upward Grower Vs Hedger,Forward contract, Cash Sale, Marketing pools , (USDA CCC loan program), Market Trends- Year wise, Cotton Hedging, Put Option Vs Call Option, Cotton Futures, Production Hedging / Storage Hedging Cotton Hedging- Indian Context, MCX India, Trading Procedure- MCX India, MCX India, Monitoring & Interpretation- daily, Cotlook- A Index, International Cotton price movement, China Cotton Index (CC3128B), NYE/ICE, Sankar 6, Pakistan, Monthly Summary Reports, Monsoon- Explained, Acreage of sowing

REFERENCES:

1. W S Anthony “Cotton Ginners Handbook”, US Department of Agriculture, Agriculture Research Service, 1994

2. Indra Doraiswamy, P. Chellamani, A. Pavendhan, “Cotton Ginning: A Critical Appreciation of Recent Developments” Textile Institute, 1993

3. Neeraj Niijjawan and Rasshmi Niijjawan “Unravel Uniqueness: Grading of Cotton” Bridge Media 2008, ISBN 978-81-906857-0-2

4. R G Steadman “Cotton Testing” Textile Progress, Textile Institute, 1997. ISBN 978-1870812856

5. Pintu Pandit “Recycling waste in fashion and textiles”, Scrivener Publishing, John Wiley &


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Sons, 2020, ISBN 978-1-119-62049-5

6. Richard Blackburn “Sustainable Apparel Production, Processing and Recycling” Woodhead Publishing Limited, ISBN: 978-1-78242-339-3

7. A .Richard Horrocks “Recycling Textile and Plastic Waste” Woodhead Publishing Limited, 1996, ISBN 978-1-85573-306-0

8. Youjiang Wang “Recycling in textiles”, Woodhead Publishing Limited, 2006, ISBN-13: 978-1-85573-952-9

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