

**DEPARTMENT OF RURAL INDUSTRIES AND MANAGEMENT**  
**Programme: Diploma in Textile Technology**  
**Syllabus Outline and Scheme of Examinations (2015-2016) as per CBCS New Regulations**

Semester	Category	Course Code (1)	Title of the Course (2)	No. of Credits (3)	No. of Hours / Per Week (4)	Duration of ESE Hours	Marks		Total Marks (7) (5+6)
							CFA (5)	ESE (6)	
I	Language - I Core Courses	15ENGD0101	English Communication Skills-I	2	2	2	20	30	50
		15RIMD0101	General Engineering	3	3	3	40	60	100
		15RIMD0102	Engineering Graphics	3	3	3	40	60	100
		15RIMD0103	Workshop Practice	2	4	3	75	25	100
		15RIMD0104	Textile Fibers	3	3	3	40	60	100
		15RIMD0105	Yarn Manufacture - I - Theory	3	3	3	40	60	100
		15RIMD0106	Yarn Manufacture - I - Practical	2	4	3	75	25	100
		15RIMD0107	Fabric Manufacture - I - Theory	3	3	3	40	60	100
		15RIMD0108	Fabric Manufacture - I - Practical	2	4	3	75	25	100
		<b>Total</b>		<b>23</b>	<b>29</b>	<b>26</b>	<b>445</b>	<b>405</b>	<b>850</b>
II	Language -II	15ENGD0201	English Communication Skills- II	2	2	2	20	30	50
	Computer Skill	15CSAU02N1	Computer Fundamentals and office Automation - Theory & Practical	3+1	3+2	3	40	60	100
	Core Courses	15RIMD0209	Yarn Manufacture - II - Theory	3	3	3	40	60	100
		15RIMD0210	Yarn Manufacture - II - Practical	2	4	3	75	25	100
		15RIMD0211	Fabric Manufacture -II -Theory	3	3	3	40	60	100
		15RIMD0212	Fabric Manufacture - II - Practical	2	4	3	75	25	100
		15RIMD0213	Textile Testing and Quality Assurance -Theory	3	3	3	40	60	100
		15RIMD0214	Textile Testing and Quality Assurance - Practical	2	4	3	75	25	100
		<b>Total</b>		<b>21</b>	<b>28</b>	<b>25</b>	<b>405</b>	<b>345</b>	<b>750</b>
III	Core Courses	15RIMD0315	Fabric Manufacture - III-Theory	3	3	3	40	60	100
		15RIMD0316	Fabric Manufacture - III-Practical	2	4	3	75	25	100
		15RIMD0317	Textile Wet Processing - I-Theory	3	3	3	40	60	100
		15RIMD0318	Textile Wet Processing - I-Practical	2	4	3	75	25	100
		15RIMD0319	Fabric Structure and Colour - Theory	3	3	3	40	60	100
		15RIMD0320	Fabric Analysis and Design & Colour -Practical	2	4	3	75	25	100
		15RIMD0321	Summer In Plant Training Evaluation*	2	-	-	100	-	100
	Major Elective	15RIMD03EX	<b>Elective - I -Theory *</b>	3	3	3	40	60	100
		15RIMD03EY	<b>Elective - I -Practical *</b>	2	4	3	75	25	100
	VPP	15EXNP03V1	Village Placement Programme	2	-	-	50	-	50
		<b>Total</b>		<b>24</b>	<b>28</b>	<b>24</b>	<b>610</b>	<b>340</b>	<b>950</b>
IV	Core courses	15RIMD0422	Environmental Engineering in Textile Industry	3	3	3	40	60	100
		15RIMD0423	Textile Management and Entrepreneurship	3	3	3	40	60	100
		15RIMD0424	Textile Wet Processing - II - Theory	3	3	3	40	60	100
		15RIMD0425	Textile Wet Processing - II - Practical	2	4	3	75	25	100
		15RIMD0426	Computer Aided Textile Designing and Colour Matching - Practical	2	4	3	75	25	100
	Major Elective	15RIMD04EX	<b>Elective - II -Theory *</b>	3	3	3	40	60	100
		15RIMD04EY	<b>Elective - II -Practical *</b>	2	4	3	75	25	100
		15RIMD0427	Project	4	4	-	40	60	100
		<b>Total</b>		<b>22</b>	<b>28</b>	<b>21</b>	<b>425</b>	<b>375</b>	<b>800</b>
		<b>Grand Total (I+II+III+IV)</b>		<b>90</b>	<b>113</b>	<b>96</b>	<b>1885</b>	<b>1465</b>	<b>3350</b>

<b>Elective - I*</b> <b>Theory &amp; Practical</b>	15RIMDO3E1	Technology of Silk - Theory
	15RIMDO3E2	Technology of Silk - Practical
	15RIMDO3E3	Garment Technology - Theory
	15RIMDO3E4	Garment Technology - Practical
	15RIMDO3E5	Advanced Fabric Manufacture - Theory
	15RIMDO3E6	Advanced Fabric Manufacture - Practical
	15RIMD4E07	Merchandizing and Export Marketing - Theory
	15RIMD4E08	Merchandizing and Export Marketing - Practical

<b>Elective - II **</b> <b>Theory &amp; Practical</b>	15RIMD04E9	Elective II - Advanced Fabric Structure and Design - Theory
	15RIMD4E10	Elective II - Advanced Fabric Structure and Design - Practical
	15RIMD4E11	Knitting Technology - Theory
	15RIMD4E12	Knitting Technology - Practical
	15RIMD4E13	Advanced Textile Wet Processing - Theory
	15RIMD4E14	Advanced Textile Wet Processing - Practical
	15RIMD4E15	Technical Textiles - Theory
	15RIMD4E16	Technical Textile - Practical

**NOTE: \* Summer In Plant Training Evaluation (6 Weeks)\*: Students will undergo in plant training during summer vacation and the marks will be awarded in the third semester under summer in plant training evaluation course.**

## SUMMARY

### DIPLOMA IN TEXTILE TECHNOLOGY (2015-2016)

#### I. Language I

15ENGD0101	English Communication Skills-I
15ENGD0201	English Communication Skills-II

#### II. Core Courses

15RIMD0101	General Engineering
15RIMD0102	Engineering Graphics
15RIMD0103	Workshop Practice
15RIMD0104	Textile Fibres
15RIMD0105	Yarn Manufacture - I - Theory
15RIMD0107	Fabric Manufacture -I -Theory
15RIMD0201	Yarn Manufacture - II - Theory
15RIMD0203	Fabric Manufacture -II -Theory
15RIMD0205	Textile Testing and Quality Assurance -Theory
15RIMD0301	Fabric Manufacture - III-Theory
15RIMD0303	Textile Wet Processing - I-Theory
15RIMD0305	Fabric Structure and Colour -Theory
15RIMD0403	Textile Wet Processing - II Theory
15RIMD0406	Project Work

#### III. Core Practicals

15RIMD0106	Yarn Manufacture I - Practical
15RIMD0108	Fabric Manufacture I - Practical
15RIMD0202	Yarn Manufacture - II - Practical
15RIMD0204	Fabric Manufacture - II - Practical
15RIMD0206	Textile Testing and Quality Assurance - Practical
15RIMD0302	Fabric Manufacture - III-Practical
15RIMD0304	Textile Wet Processing - I-Practical
15RIMD0306	Fabric Analysis and Design & Colour -Practical
15RIMD0307	Summer In Plant Training Evaluation
15RIMD0404	Textile Wet Processing - II - Practical
15RIMD0405	Computer Aided Textile Designing and Colour Matching - Practical

#### IV. Major Elective

##### Elective - I

15RIMD03E1	Technology of Silk -Theory
15RIMD03E2	Technology of Silk - Practical
15RIMD03E3	Garment Technology - Theory
15RIMD03E4	Garment Technology - Practical
15RIMD03E5	Advanced Fabric Manufacture - Theory
15RIMD03E6	Advanced Fabric Manufacture - Practical
15RIMD4E07	Merchandizing and Export Marketing - Theory
15RIMD4E08	Merchandizing and Export Marketing - Practical

##### Elective - II

15RIMD04E9	Elective II - Advanced Fabric Structure and Design - Theory
15RIMD4E10	Elective II - Advanced Fabric Structure and Design - Practical
15RIMD4E11	Knitting Technology - Theory
15RIMD4E12	Knitting Technology - Practical
15RIMD4E13	Advanced Textile Wet Processing - Theory
15RIMD4E14	Advanced Textile Wet Processing - Practical
15RIMD4E15	Technical Textiles - Theory
15RIMD4E16	Technical Textile - Practical

#### V. Computer Skill

	Introduction to Computer and Office Automation - Theory
	Introduction to Computer and Office Automation - Practical

#### VI. Village Placement Programme

15EXNPO3V1	Village Placement Programme
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**TEXTILE FIBRES**  
(Credit: 3 Hours: 3 CFA: 40; ESE: 60)

**Objectives:**

- To know about the scientific properties, Chemical behaviors and Engineering techniques of various Textile fibres
- To introduce different types of fibres and its applications to the students of DTT

**Specific Objective of Learning (SOL)**

- Identifies the chemical behavior of various fibres with different Organic and inorganic students
- Assess the mechanical properties of Textile fibres, understand the alternative strategies of fiber production method.
- Students would be able to understand seed fibre varieties, Physical, chemical properties and end uses of cotton;
- Students study about animal and mineral fibres, its characteristics, processing and properties;
- They will also learn polymerization techniques,
- They could differentiate synthetic fibre with natural fibres.
- Students could be able to do the post spinning operations and texturization in addition to textured yarn at the end of the course.

**Lecture Schedule**

Unit	Particulars/ Content	Hours
1	<b>Natural Fibres</b>	0
	Introduction: Definition - classification of Textile fibres. <b>Cotton:</b> Introduction to seed fibre.	2
	Varieties of Indian and other country's cotton, Grading of cotton. Physical and chemical properties and end uses of cotton.	2
	<b>Bast Fibres:</b> Different varieties of bast fibres and introduction - Jute and Flax fibre- Retting process.	2
	Physical and chemical properties and end uses of bast fibres.	2
2	<b>Animal Fibres</b>	0
	Introduction of animal fibres. Detailed study about wool fibre production and cleaning of raw wool.	2
	Varieties of wool grown in the world. Characteristic of wool fibre and their grading. Brief study about worsted and woollen yarn production and the types of machineries used.	2
	Physical and chemical properties and end uses of wool and special properties of wool fibre. Felting of wool. Introduction to silk fibre, life cycle of silk worm and sericulture production.	3
	Types Indian and foreign silk varieties, classification of silk. Important diseases that affect silk worm and their control.	2
Physical and chemical properties and end uses of silk. Processing of silk - degumming process, twisting and weighting of silk.	2	
3	<b>Regenerated Fibres</b>	0
	<b>Introduction:</b> Definitions - Monomer and Polymer - Polymerization techniques - Degree of Polymerization	2
	Properties required for a fibre forming polymer. Introduction to regenerated fibres. Production of viscose Rayon and Acetate Rayon - Raw material to fibre production.	2
	Staple fibre manufacturing. Physical and chemical properties and end uses and special properties of regenerated rayons.	2
4	<b>Synthetic Fibre</b>	0
	<b>Polyamide Fibres:</b> Manufacturing process of Polyamide fibres - Nylon 6 and Nylon 66 from raw material synthesis to fibre production and post spinning operations. Physical and chemical properties and end uses and special properties of Nomex / Kevlar fibre. Physical and chemical properties and end uses and special properties of aromatic polyamide.	2
	<b>Polyester Fibre:</b> Introduction to polyester fibres. Manufacturing process of polyester fibre, starting from the raw material synthesis to fibre producing and post spinning operations. Physical and chemical properties and end uses and special properties of polyester fibre. Introduction to aromatic polyesters and their manufacturing process	3
	<b>Poly-Acrylic Fibre:</b> Introduction to poly-acrylic fibres. Types of acrylic fibres Manufacturing process of poly-acrylic fibre, starting from the raw material synthesis to the fibre production and post spinning operations. Physical and chemical properties and end uses and special properties of poly-acrylic fibre.	2
5	<b>High-performance fibre</b>	0
	Properties of Polyolefines Fibre, carbon fibre, elastane fibre, Glass fibre, Asbestos fibre, Silicon fibre, Kevlar fibre, Nomex fibre, HDPP fibre and end uses of high performance fibre	4
	<b>Post Spinning Operations: Spin finish,</b> Staple fibre manufacturing process. Turbo stapler and Pacific converter, working principle and functioning.	4
	<b>Total</b>	<b>40</b>
	<b>CFA and DC Meeting</b>	
	CFA-I, II, III	4.5
	DC Meeting	3.5

**15ENG0101: ENGLISH COMMUNICATION SKILLS - I**

(No of Hours: 2    Credit: 2    CFA: 20; ESE: 30)

(As per the Syllabus passed in the Board of Studies of the Department of English, GRI)

**Unit-I**

1. Leo Tolstoy: Little girls Wiser than men
2. R.K.Narayan: An Astrologer's day (6 Hours)

**Unit-II**

1. Oscar wild : The selfish Giant
3. Tagore: My Load ,the Baby (6 Hours)
- 2.

**Unit-III**

1. O'Henry: After Twenty Years
4. Stephen Leacock: the Conjuror's Revenge (6 Hours)

**Unit-IV****Grammar**

1. Nouns-Tense-Antonyms and synonyms-prefixes and suffixes-Articles and prepositions-Active and Passive Voice (7 Hours)

**Unit-V****Grammar**

1. Basic sentence patterns- Direct and Indirect speech-Forming questions-Question tags- Conditional clauses. (7 Hours)

**References**

Prof.K.G.Seshadri(ed),Twelve Tales,Anuradha Agencies &amp; Publishing,Kumbakonnam(2006)

**15RIMDO101: GENERAL ENGINEERING**  
(No of Hours: 3    Credit: 3    CFA: 20; ESE: 30)

**Objectives:** To understand the fundamentals of mechanical, Electrical, Electronics Engineering

**Learning outcome:**

- Students have been exposed in different branches of engineering like mechanical, Electrical , Electronics and Civil.
- Students have confident to understand the environment and manage to supervise any production Industry after the course of study.

**Unit I - Elements of Mechanical Engineering**

**Air Compressors:** Principle of air compression - block diagram - construction and working of axial and centrifugal type air compressors - uses of compressed air.

**Air Conditioning:** Principle of air conditioning - Room air conditioning - Comparison of summer and winter air conditioning - Comparison of Room and centralized air-conditioning.

**Transmission of Power:** Types of drives - belts -flat, circular and V belts - velocity ratio - slip - related calculations.

**Clutches and brakes:** Principle and uses of clutches - Single plate clutch - Principle of brake - working of hydraulic brake. (10 Hours)

**Unit - II: Elements of Electrical Engineering - I**

Basic ideas and definitions of electrical quantities - current, voltage, power, resistance, etc. Types of supplies - A.C. and D.C. - definitions of frequency, RMS and instantaneous value - inductance, capacitance and resistance in A.C. circuits - D.C. circuits - Basic laws - Ohm's law and Kirchoff's law - Resistances and capacitors in series and parallel - Simple calculations involving current, voltage, resistance, capacitance and power etc (10 Hours)

**Unit - III: Elements of Electrical Engineering - II**

Principle of electromagnetic induction - construction and working principle of A.C generator - 3 phase A.C. generator - Transformer - basic principle - construction and working - step up and step-down transformer - Motors - Principle of a motor - Flemming's left hand and right hand rule - Induction motors. (10 Hours)

**Unit - IV: Elements of Electronics Engineering-I**

Atomic structure - concept of free electrons - electron flow in a conductor - Electronic emission - Photo electric emission - photoelectric effect - Photocell in Textilers (8 Hours}

**Unit - V: Elements of Electronics Engineering-II**

Semi conductors - doping of semiconductors - PN junction diodes - diodes as rectifiers - NPN and PNP transistors - principle of working - 3 different configurations of a Transistor - Transistor amplifier - Transducers - Principle of LVDT and strain gauges - applications of transducers. Electronic Speed; control devices - Stepper and Servomotors - applications. (10 Hours)

**References:**

1. DAS.Saro Thermal Engineering, A text book of Hydraulics - R.S.Khurmi, S.Chand & Co.(2006)
2. Theraja B.L. A text book of Electrical technology, S. Chand & co (2008)
3. Mehta V.K Basic Electronics Integrated Electronics - Millman and Halkias

**15RIMD0102: ENGINEERING GRAPHICS**

(No of Hours: 3      Credit: 3      CFA: 40; ESE: 60)

**Objectives:** To understand about the Engineering curves, Projections , Lines, Plans - Orthographic Views - Drawing through computer.

**Learning outcome:**

- Use drawing equipment, instruments and materials and lettering rules.
- Follow and apply standard practice as per Bureau of Indian standards for planning and layout of Engineering objects

**Unit I: Drawing Instruments and Their Uses**

Drawing instruments and their uses - importance of engineering drawing as a graphic communication - drawing practice as per IS codes - list of equipment -drawing boards - mini drafter - large compass - bow compass - use of compass - dividers and their use - drop spring bow instruments and their uses - protractor - set of scales or rules - pencils of different grades - drawing sheets - various sizes as per IS and their layout - drafting machine - inking pen.

(10 Hours)

**Unit II: Lettering, Numbering and Dimensioning**

Importance of legible lettering and numbering - single stroke letters - capital and lower case letters - general procedure for lettering and numbering - height of letters - guidelines.

Dimensioning: Need for dimensioning - dimensioning terms and narrations as per IS - dimensioning line, extension line and leader line - placement of dimensions - unidirectional and aligned methods - important dimensioning rules - dimensioning of common features - diameters, radii, holes, chamfers - additions of letters and symbols - parallel, chain and progressive dimensioning.

(10 Hours)

**Unit III: Scales & construction of Conics and Geometrical Curves**

Scales - reducing and enlarging scales - plain and diagonal scales -symbol for first angle and third angle. Conics - different types - explanation of locus, focus, and directrix - application of ellipse, parabola, and hyperbola - Ellipse: construction of ellipse by concentric circles method, rectangular method when major and minor axes are given - Parabola:

(10 Hours)

**Unit IV: Geometrical Construction Rectangular and parallelogram**

Construction by rectangular and parallelogram method - construction of hyperbola when eccentricity is given - construction of cycloid and involutes of a circle.

(8 Hours)

**Unit V: Projection of Solids**

Projection of simple solids: Cube - Cylinder - Cone, given (i) Axis perpendicular to one plane and parallel to the other plane (ii) Axis parallel to both the principal planes (iii) Axis parallel to one plane and inclined to the other plane.

(10 Hours)

**Reference**

1. Manian S.S, Rajagopal P, *Technical Drawing*, Balachitra Publishers, Madurai-3. (2006)
2. Balasundaram K,.Parthasarathy S.V, *Technical Drawing*, Pratheeba Publishers, Coimbatore-1.(2006)
3. Venugopal K, *Engineering Drawing and Graphics*, New Age International (P) Ltd., New Delhi. (2002)
4. Gill P.S, *Engineering Drawing*, S.K. Kataria & Sons, Delhi. (2002)
5. Bhatt N.D, *Engineering Drawing and Graphics*, Charotar Publishing House, Anand (Gujarat).(2006)
6. Narayana K.Land Kannaiah P *Engineering Graphics*, Tata Mcgraw Hill New Delhi (2004)
7. Lakdshminarayanan Y and Vaish Wanar R.S *Engineering Graphics*, Jain Brothers, New Delhi.(2006)
8. Chandra A.M and Chadra Satish, *Egineering Graphics*, Narosa (2006).

**15RIMD0103: WORKSHOP PRACTICE**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives :** To have knowledge in cutting tools, drilling , joining , welding and Threading in different shapes on different metals

**Learning outcome:**

- Students have been practiced in cutting tools. Drilling , joining , welding threading and job making with different shapes of different Metals.
- It help the students to understand the various mechanism of machineries used in textile industries

**Unit: I Cutting Practice**

Cutting by Hacksaw, Cutting by file, cutting by scissors. (6 Hours)

**Unit: II Drilling Practice**

Drilling by hand drill, drilling by electrical hand drill, drilling by power vertical drill, drilling by lathe. (6 Hours)

**Unit: III Joining and Welding**

a) **Joining or fixing:** Fixing by riveting.  
b) **Welding:** Arc welding (6 Hours)

**Unit: IV Threading Practice**

Threading by lathe, threading by taps and die set. (6 Hours)

**Unit: V Job Making**

a). Three jobs with different shapes on different metals.  
b). **Fitting Job:** One fitting job (8 Hours)



## 15RIMD0104: TEXTILE FIBRES

(No of Hours: 3 Credit: 3 CFA: 40 ESE: 60)

## Objectives:

- To know about the scientific properties, Chemical behaviors and Engineering techniques of various Textile fibres
- To introduce different types of fibres and its applications to the students of DTT

## Specific Objective of Learning (SOL)

- Identifies the chemical behavior of various fibres with different Organic and inorganic students
- Assess the mechanical properties of Textile fibres, understand the alternative strategies of fiber production method.
- Students would able to understand seed fibre varieties, Physical, chemical properties and end uses of cotton;
- Students study about animal and mineral fibres, its characteristics, processing and properties;
- They will also learn polymerization techniques,
- They could differentiate synthetic fibre with natural fibres.
- Students could able to do the post spinning operations and texturization in addition to textured yarn at the end of the course.

## Unit - I Natural Fibres

Introduction: Definition - classification of Textile fibres.

**Cotton:** Introduction to seed fibre. Varieties of Indian and other country's cotton, Grading of cotton. Physical and chemical properties and end uses of cotton.

**Bast Fibres:** Different varieties of bast fibres and introduction - Jute and Flax fibre- Retting process. Physical and chemical properties and end uses of bast fibres.

(8 Hours)

## Unit - II Animal Fibres

Introduction of animal fibres. Detailed study about wool fibre production and cleaning of raw wool. Varieties of wool grown in the world. Characteristic of wool fibre and their grading. Brief study about worsted and woollen yarn production and the types of machineries used. Physical and chemical properties and end uses of wool and special properties of wool fibre. Felting of wool.

Introduction to silk fibre, life cycle of silk worm and sericulture production. Types Indian and foreign silk varieties, classification of silk. Important diseases that affect silk worm and their control. Physical and chemical properties and end uses of silk. Processing of silk - degumming process, twisting and weighting of silk.

(11 Hours)

## Unit - III Regenerated Fibres

**Introduction:** Definitions - Monomer and Polymer - Polymerization techniques - Degree of Polymerization - Properties required for a fibre forming polymer.

Introduction to regenerated fibres. Production of viscose Rayon and Acetate Rayon - Raw material to fibre production. Staple fibre manufacturing. Physical and chemical properties and end uses and special properties of regenerated rayons.

(6 Hours)

## Unit - IV Synthetic Fibre

**Polyamide Fibres:** Manufacturing process of Polyamide fibres - Nylon 6 and Nylon 66 from raw material synthesis to fibre production and post spinning operations. Physical and chemical properties and end uses and special properties of Nomex / Kevlar fibre. Physical and chemical properties and end uses and special properties of aromatic polyamide.

**Polyester Fibre:** Introduction to polyester fibres. Manufacturing process of polyester fibre, starting from the raw material synthesis to fibre producing and post spinning operations. Physical and chemical properties and end uses and special properties of polyester fibre. Introduction to aromatic polyesters and their manufacturing process.

**Poly-Acrylic Fibre:** Introduction to poly-acrylic fibres. Types of acrylic fibres Manufacturing process of poly-acrylic fibre, starting from the raw material synthesis to the fibre production and post spinning operations. Physical and chemical properties and end uses and special properties of poly-acrylic fibre.

(7 Hours)

## Unit - V High-performance fibre

Properties of Polyolefines Fibre, carbon fibre, elastane fibr, Glass fibre, Asbestos fibre, Silicon fibre, Kevlar fibre, Nomex fibre, HDPP fibre and end uses of high performance fibre

**Post Spinning Operations:** Spin finish, Staple fibre manufacturing process. Turbo stapler and Pacific converter, working principle and functioning.

(8 Hours)

## References:

- Moncrieff, R.W., (1975), "Man-made fibres", 6th Edition, Wiley- Inter science,.
- Carolina, S., (1968) "Textile processing", Vol. I, State Department of Education,
- V.A. Shenai, (1997) Textile fibres 2nd Revised edition in the series, "Technology of Textile Processing" Vo.I Sevak publications, Bombay.
- P.W.Moncrieff, (1975), Manmade fibres 6th edition, New nes - Butterworths, London.
- E.P.C. Gohle and L.D. Vilensty, (1987), Textile Science 1st Indian edition, CBS Publishers and Distributors Delhi, India.
- Corbman, (2010), 'Fibre to Fabric', Tata Mc Graw Hill, New Delhi (.

**15RIMD0105: YARN MANUFACTURE - I THEORY**

(No of Hours: 3    Credit: 3    CFA: 40; ESE: 60 )

**Objectives:** To have knowledge about the processing of fibres in various Yarn Manufacturing Machineries Like Ginning, Blow Room, Cording, Drawing and Combing.

**Learning outcome:**

- The students will learn on the choice of process parameters, setting the machinery and maintenance

**Unit I Ginning & Blow Room**

Objectives of Ginning - Study of working of different gins - Knife roller gin saw gin, Ginning out-turn. Effect of ginning performance on yarn quality. Study of contamination detector, fibre properties to be considered for mixing - study of auto mixer - unimix - multi mixes, Bale management using HVI Instrument. Study of Beaters. Step cleaner - Axi-flow cleaner - ERM cleaner. Lap length measuring motion - Mechanism of lap formation - Chute feed.

(8 Hours)

**Unit-II Carding**

Objectives of Carding - Study of working of high production cards - speed and settings - Concept of auto leveling - Heel and toe arrangement - Study of Stripping and Grinding - Study of Clothing-Developments in the Doffer Zone - Gross roll verga - Apron doffing system - Hook Theory Production Calculation.

(10 Hours)

**Unit-III Drawing**

Study of fibre arrangement in carding and draw sliver, Principle and objectives of doubling and drafting. Different types of drafting systems - Weighting system - Control systems - Study of auto levelers -- influence of roller slip - drafting waves - roller eccentricity - stop motions

(10 Hours)

**Unit-IV Combing**

Preparation for Combing: Study of Sliver lap machine - Ribbon lap machine - Super lap machine - Objectives and importance of combing process working of comber - Degree of Combing - Combing Cycle - Salient features of modern comber - Unicom Calculations of production.

(10 Hours)

**Unit-V Blend Yarn Spinning**

Spinning of Cotton, Polyester, Wool and Cellulosic Blends. Study of Silk: Grainage & Filature work

(10 Hours)

**References**

1. Klein W., Vol. 1-3, "The Technology of Short Staple Spinning", "A Practical Guide to Opening & Carding" and "A Practical Guide to Combing, Drawing, and Roving frame", The Textile Institute, Manchester, U.K., 1998.
2. Chattopadhyay R. (Ed), Advances in Technology of Yarn Production, NCUTE, IIT Delhi, 2002.
3. Chattopadhyay R., Technology of Carding, NCUTE, IIT Delhi, 2003.
4. Chattopadhyay R. & Rengasamy R., "Spinning, Drawing, Combing & Roving, NCUTE Pilot Programme.
5. Salhotra K. R. & Chattopadhyay R., Book of papers on "Blowroom and Carding", IIT Delhi 1998.
6. Duraiswamy I, Chellamani P & Pavendhan A., "Cotton Ginning" Textile Progress, The Textile Institute, Manchester, U.K., 1993.

**15RIMD0106: YARN MANUFACTURE - I PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives :** To have knowledge about the processing of fibres in various Yarn Manufacturing Machineries Like Ginning, Blow Room, Cording, Drawing and Combing.

**Learning outcome:**

- Setting the production process in blow room, carding, draw frames and combers knowledge in maintenance of machineries and calculations.

**PRACTICAL**

1. Study of ginning machine
2. Study of blowroom machinery
3. Settings and production calculations in blowroom
4. Card - draft and production calculations
5. Card - Settings
6. Construction details of Drawframe
7. Draft calculation in Drawframe
8. Study of comber preparatory machines
9. Construction details of comber
10. Draft calculation in comber

**15RIMD0107: FABRIC MANUFACTURE - I -THEORY**

(No of Hours: 3    Credit: 3    CFA: 40; ESE: 60)

**Objectives:** To know about the methods and process of winding, warping and sizing using ordinary and high speed machineries.

**Learning outcome:**

- The students will have knowledge of processing various counts of yarns in machineries. This will enable the students to work in weaving sector.

**Unit-I Introduction of Winding**

Description of machines and accessories used for warp and weft and weft winding in Handloom industry - Classification of winders - precision winding. Types and working principles of yarn clearers, knotters and splicers - Classification of yarn faults - Types of tensioners, guides-cop unwinding characteristics - stop motions - cone defects, causes and rectification. (8 Hours)

**Unit-II Features of Automatic Winding**

Features of automatic cheese and cone winding of synthetic yarns, blended yarns. Types and working principle of pirn winding machines - building, stop motion - features of automatic pirn winding machine - production and efficiency calculation - pirn defects - causes and remedies. (10 Hours)

**Unit-III Introduction and Features of Automatic Warping**

Types of warping used in Handloom industry - peg, vertical & horizontal warping - Beam warping machines - types - creels - stop motion - brakes - length measuring motion - features of modern warping machines - sectional warping machine - creel - lease reed-stop motion - end breaks in warping - quality control - beam defects - causes - remedies. Production and efficiency calculations (10 Hours)

**Unit-IV Introduction and Features of Automatic Sizing**

Sizing practice used in Handloom centers - Hang sizing & street sizing - Types and selection of ingredients for sizing. Size preparation and storage equipments - sizing machines - multi-cylinder & hot air - control systems in sizing machines - mechanism of cylinder drying, beam pressing devices - mechanical, pneumatic, hydraulic devices. (10 Hours)

**Unit-V Sizing Development and Drawing Operations**

Single end sizing machines - sizing of blended & filament yarns - process control in sizing - sizing faults - causes & remedies - modern development in sizing, Efficiency and production calculations. Need for drawing-in operation, working principles of manual, semiautomatic and automatic drawing - in machines - knotting (10 Hours)

**REFERENCES**

1. Ajaonkar D.B., Talukdar M.K. and Wedekar, Sizing: Material Methods and Machineries, Mahajan Publications Ahmedabad, 1999.
2. Lord P.R. and Mohammed M.H., Weaving - Conversion of Yarn to Fabric, Merrow Publication, 1992.
3. Sen Gupta, Yarn preparation', Vol.I and II, Mahajan publication Ahmedabad.
4. Modi J.R.D., Sizing Ingredient, Mahajan Publications, Ahmedabad.
5. Booth J.E., Textile Mathematics, Vol.II & III, Textile Institute, Manchester, U.K., 1975.

**15RIMD0108: FABRIC MANUFACTURE - I PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives:** To know about the methods and process of winding , warping and sizing using ordinary and high speed machineries

**Learning outcome:**

- The students will have knowledge to the above machineries. This enable the students to work in weaving sector and process various counts of yarns..

**Warp winding**

1. Winding practice on double flanged bobbin and Dabba for Hand weaving.
2. Calculation of speed of drums.
3. Calculation of traverse speed.
4. Calculation of production and efficiency.
5. Running of cone winder to produce cones.

**Pirn Winding**

6. Winding practice on pirns for Hand weaving.
7. Calculation of spindle speed and traverse speed.
8. Running the pirn winder to wind yarn on the pirn with given conditions.

**Warping**

9. Preparation of ball warp and beam warp.
10. Warp preparation in sectional warping machine.

**Sizing**

11. Preparation of size mixture.
12. Sizing of yarn, Sizing of Hank
13. Piecing up and Drawing-in
14. Denting-in and Dressing - in
15. Gaiting-in

**15ENGDO201: ENGLISH COMMUNICATION SKILL - II**

(No of Hours: 2    Credit: 2    CFA: 20; ESE: 30)

(As per the Syllabus passed in the Board of Studies of the Department of English, GRI)

**Unit-I Prose & Poetry**

Prose

C.M.Joad : the way of Mahatma

Poetry

John Milton: On his blindness

(6 Hours)

**Unit-II Prose & Poetry**

Prose

A.G..Gardiner : On Umbrella Morals

Poetry

William wordsworth:Daffodils

(6 Hours)

**Unit-III Prose & Poetry**

Prose

J.Bronowski : On Art of Science

Poetry

Nissim Ezekiel:The night of the scorpion

(6 Hours)

**Unit-IV Prose & Poetry**

Prose

Stephen Leacock : My lost dollar

Poetry

Kamala Das:My Grandmother's House

(6 Hours)

**Unit-V Grammer**

Grammer and composition

Tranformation of sentences

Précis Comprehension/notemaking

(8 Hours)

**INTRODUCTION TO COMPUTER AND OFFICE AUTOMATION - THEORY**

(No of Hours: 3      Credit: 3      CFA: 40; ESE: 60)

(As per the Syllabus passed in the Board of Studies of the Department of Computer Science and Application, GRI)

**Unit-I Introduction**

Computer definition-anatomy of a computer -generations of computers-types of computers, storage devices. Floppy disk-Hard disk-Optical disk-Computer terminologies (8 Hours)

**Unit-II Input and Output devices**

Keyboard-pointing devices mouse-track ball-Joystick-touch screen-dot matrix printers-laser printers-plotters-types of screens. Introduction to windows: Using mouse -icons-files and folders-creating copying -moving-deleting and renaming -searching (10 Hours)

**Unit-III Ms word 2000 word processing**

Features-document creating-editing -cursor movements-selection of text-copying text-moving text-finding and replacing text-spell checking-page setup-mail merge (10 Hours)

**Unit-IV MS-Excel 2003**

Work sheet-advantages-organization of work sheet area-editing -range-formatting worksheet-chart creation-change type-print options -build in functions (10 Hours)

**Unit-V Power point**

Features-create-view-save and close presentation-changing the appearance of presentation - special effects adding table, insert charts-using templates and cliparts -getting help (10 Hours)

**References**

1. P.C .Software for windows .R.K.Taxkali,TATA McGraw Hill publishing ,NewDelhi
2. Microsoft Office 200,Rebase,jh.Fiala,Je Griesenthwaite,Maria raria reid,Karl Schwartz,Cathy vesecky,BPB Publishing's New Delhi 1999
3. MS-Office 200 by Jennifer Fulton ,Prentice Hall of India Private Limited New Delhi

**INTRODUCTION TO COMPUTER AND OFFICE AUTOMATION PRACTICAL**

(No of Hours: 2      Credit: 1      CFA: 37.5; ESE: 12.5)

(As per the Syllabus passed in the Board of Studies of the Department of Computer Science and Application, GRI)



**15RIMD0201: YARN MANUFACTURE - II - THEORY**

(No of Hours: 3      Credit: 3      CFA: 40; ESE: 60))

**Objectives:** To have knowledge about the process of Fibres in Yarn Manufacturing Machineries like speed frame , Ring frame-Yarn dabbling, reeling, bundling and bailing

**Learning outcome:**

- Enable the students to have knowledge in process parameters, setting and maintenance of above machineries in spinning mills.

**Unit - I Speed Frame**

Objectives of Speed frame - Principle of working of modern speed frame. Design and setting of various mechanism - Difference between bobbin lead/ Flyer lead. Study of Draft - Twist - Roll Speed and Setting - Apron Spacing on yarn quality - Study of Building mechanism. Various change places in fly frame. (12 Hours)

**Unit II Ring Frame**

Study of Drafting - Twisting - Winding and Building. Study of creels - Traverse motion -Drafting System - Roller Inclination - Top roller weighting - Spacer use - Objects of Ring and Traveller - Modern anti wedge and SV Rings and their comparison with conventional rings. Types of Travellers and their selection - Running - in period. Spindles - Construction details Ballooning - Brief Study of Spindle tapes.

**Building Mechanism:** Object and function of Building mechanisms - Defects and remedies. (12 Hours)

**Unit - III Doubling**

Objects of Doubling - Rings, Travellers - Doubled yarn uses, Two for one twist. (8 Hours)

**Unit IV Reeling Bundling, Baling**

Objects of Reeling - Straight and Cross reeling - fancy yarn production - Bundling - Bundle weight - No.of knots (8 Hours)

**Unit V Traditional Spinning Devices**

**Spinning Charkas:** Types of Spinning equipment - Takli - Kissan, Ambar Charkas, 2, 6, 8, 12 Spindle NMC. Productions calculations and metric yarn numbering. (8 Hours)

**Reference:**

1. Klein W. Vol. 4- 5 "A Practical Guide to Ring Spinning 1987 and New Spinning Systems, 1993. The Textile Institute Manchester, 1987.
2. Chattopadhyay R., Technology of Carding, NCUTE, IIT Delhi, 2003.
3. Chattopadhyay R. & Rengasamy R., "Spinning, Drawing, Combing & Roving, NCUTE Pilot Programme.
4. Salhotra K. R. & Chattopadhyay R., Book of papers on "Blowroom and Carding", IIT Delhi 1998.
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.

**15RIMD0202: YARN MANUFACTURE - II PRACTICAL**

(No of Hours: 4      Credit: 2    CFA: 75; ESE: 25)

**Objectives:** To have knowledge about the process of Fibres in Yarn Manufacturing Machineries like speed frame , Ring frame-Yarn doubling, reeling, bundling and baling

**Learning outcome:**

- Enable the students to have knowledge on determining process parameters based on hank ,count and types of fibres in simplex ring frame and post spinning processes.

**PRACTICAL**

1. Construction details of Speed frame,
2. Draft, Twist Calculation in Speed Frame.
3. Study of Builder motion in Speed frame.
4. Practice to draw and Calculate the draft constant, Twist Constant, Spindle Speed,
5. Practice to set the spindle gauge & lappet gauging. Practice to assemble & Set the Building mechanism.
6. Practice to draw the gearing diagram to find the speed and production in Reeling machine.
7. Practice in Two spindle, 6- spindle and 8- spindle hand charkas.

**15RIMD0203: FABRIC MANUFACTURE - II - THEORY**

(No of Hours: 3      Credit: 3      CFA: 40; ESE: 60)

**Objectives :** To understand the various mechanisms of handloom and powerloom and to acquire knowledge on efficiency & weaving shed calculation and fabric defects

**Learning outcome:**

- Students have been exposed in the process of producing fabric in handloom and power loom sectors and experimenting the relationship between speed and outputs.

**Unit: 1 Introduction of Handlooms**

Different parts of handloom and their functions. Description and working of throw shuttle loom, fly shuttle loom and semi automatic handloom. Heald - type and count of heald. Reed - types and system of numbering reed. Primary, secondary and auxiliary motions on handlooms  
(10 Hours)

**Unit: 2 Motions on Handloom**

Different type of take-up motion and let-off motion used in the handloom industry - Types of heald reversing motion used in handloom , Different types of shedding and devices used in shedding with merit and demerits , Types of multiple boxes used in handlooms - drop box motion and vibrating box motion.  
(8 Hours)

**Unit: 3 Introduction of Powerlooms**

Classification of powerloom, different parts of powerloom and their functions , motions on powerloom ,Description and working of plain tappet shedding - positive and negative tappets, Heald reversing motions ,Over pick motion and under pick motion , Beat up mechanism - eccentricity of sley , Timing and setting up of different motions in powerloom.  
(10 Hours)

**Unit: 4 Motions on Powerloom**

Take up motion - 5 wheel and seven wheel units - , Warp protector motion - loose reed and fast reed, Weft stop motion - side weft fork mechanism , Oscillating back rest motion, Box motion in powerloom - object and principles of drop box mechanism, condition for good shuttle box motion, Eccle's Drop box motion - Timing and settings - card saving device - safety device - pattern card preparation, Object and principle of terry mechanism.  
(10 Hours)

**Unit: 5 Weaving Calculation**

Weaving defects and their remedies, Calculation related to take-up motion, reed and heald calculation, calculation of weight of warp and weft required for particular sort, warp, weft and total cloth cover factor, Calculation related to loom shed, shed efficiency and production of looms.  
(10 Hours)

**Reference**

1. Lord P.R. and Mohamed M.H., Weaving: Conversion of Yarn to Fabric, Merrow Publications, 1992.
2. Chakravorthy B., Mechanism of Weaving Machines, Smt.Chakravorthy serampore W.B.1982.
3. Ormerod, Modern Preparation and Weaving, Butterworths & Co. Ltd., 1983.
4. Talavasek O. & Svaty V., Shuttleless Weaving Machines, Elsevier Scientific Pub. Co., New York 1981.
5. Adanur S., Handbook of Weaving, Technomic Publishing Co., Inc., 2001.
6. Banerjee N.N. Weaving Mechanism Vol.I , Kolkatta W.B.2002.

**15RIMD0204: FABRIC MANUFACTURE - II PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives:** To understand the various mechanisms of handloom and powerloom - efficiency & weaving shed calculation - fabric defects

**Learning outcome:**

- Students have been exposed in the process of producing fabric in handloom and power loom sectors.

**PRACTICAL****Handloom**

1. Weaving practice of fly shuttle pit loom, fly shuttle frame loom, semi automatic handloom.
2. Arrangement of looms and treadle tie-up on multi treadle fly shuttle frame loom and their designing technique - dismantling.
3. Erecting and setting of handloom, semi automatic handlooms.
4. Erecting and setting of 5 whul take-up motion and frictional let -off motion on handloom.
5. Actual measurement and study of specifications of different types of handlooms, and semi automatic handlooms.

**Powerloom**

6. Practice to assemble and set the tappet shedding machine.
7. Practice to assemble and set the cone over pick mechanism.
8. Practice to assemble and set the 7 wheel take-up mechanism and calculation to find its dividend.
9. Practice to assemble and set the loose reed and fast reed mechanism.
10. Practice to assemble and set the side weft fork mechanism.
11. Practice to run the loom, knotting the broken ends and adjusting the defects.
12. Practice to erect the plain loom.

**15RIMD0205: TEXTILE TESTING AND QUALITY ASSURANCE - THEORY**

(No of Hours: 3      Credit: 3      CFA: 40; ESE: 60)

**Objectives:** To understand the principles and methods of testing the fibres, Yarn & Fabric to determine their basic characteristics - application of statistical methods on textile processing

**Learning outcome:**

Students have been exposed in testing the Fibre, yarn, and Fabric properties and its specifications.

Application of Testing methods in Textile production.

**Unit I Moisture Relation and Fibre length measurement**

Humidity about Absolute humidity, Standard testing atmosphere and Relative humidity. Wet and dry bulb hygrometer and Sling hygrometer. Moisture regain and content Standard regain. Estimation of moisture content and regain- Conditioning oven and Shirley moisture meter.

**Fibre length:** Length - Importance of fibre length. Methods of measuring fibre length- Hand-staping method, Baer sorter and Digital Fibrograph.

(8 Hours)

**Unit II Testing of Fibres for other properties**

**Fibre Fineness** - Importance of fibre fineness. Methods of fineness measurement by Sheffield type and ATIRA fibre fineness tester. Importance of Maturity. Estimation of maturity by Sodium - Hydroxide swelling method. Relationship between Maturity and Fineness.

**Fibre Strength** - Importance of fibre strength. Measurement of strength by Stelometer.

Brief idea about Uster HVI - AFIS - Strain curves for different fibres. Analysis of Trash content in raw cotton by Shirley Analyzer. Fibre Quality Index.

(10 Hours)

**Unit III Testing of Yarns**

Direct and Indirect system of yarn numbering systems - Yarn count determination by Knowle's Balance, Quadrant Balance and Uster Auto Sorter.

**Yarn Twist** :Importance of Twist. Measurement of twist -Twist contraction method and Doubled yarn twist by Take-up twist tester -Relationship between yarn count and twist and strength.

**Yarn Strength** :Importance of yarn strength. Principles of Constant Rate of Loading (CRL) and Constant Rate of Extension (CRE). Principle and study of Instruments - Single Thread strength Tester, Lea tester, Ballistic tester, Instron tensile tester.

**Yarn Evenness** - Random and periodic variations in yarn. Short term, Medium term and Long term variations. Index of irregularity. Methods for assessing yarn irregularity by Visual method, Cutting and Weighing method and Yarn appearance Board.

Principle and Study of USTER Evenness tester in detail - features of latest evenness testers - Analysis of Spectrogram. Brief study on - USTER Classimat, Yarn Hairiness and it's effects, Shirley Hairiness Meter.

(10 Hours)

**Unit - IV Testing of Fabric**

Brief study on - Shirley Thickness Gauge, Count determination by Beesley's Balance. Crimp and Fabric properties, Shirley Crimp Tester. Study on - Shirley Stiffness Tester, Drape Meter, Crease resistance and Crease recovery. Shirley Crease Recovery Tester. Serviceability, Wear and Abrasion resistance. Martindale Abrasion Tester. Importance of Tensile, Tearing and Bursting Strengths of fabric. Cloth Tensile Strength Testing by Raveled strip, Cut strip and Grab methods. Various test specimens for Tearing Strength Test. Hydraulic and pneumatic Bursting Strength Tester. Pilling in fabric and Fabric Pilling Tester. Brief study - Definitions of Fabric Air - Permeability and Fabric Air Resistance. Shirley Air - Permeability tester.Flammability of fabric - water repellency / proof of fabric - brief study of water absorb anty testers.

(10 Hours)

## Unit - V Statistical Quality Control

Classification and Tabulation of data. Types and Construction of Frequency Diagram and its application. Measures of Dispersion - Mean Deviation, Standard Deviation, Co-efficient of Variation. Quality Control Charts - Concept of quality and Meaning of Control. Construction of Control charts for Averages and Ranges. Interpretation of Control Charts. Application of X - Chart to suit Textile Processes.

(10 Hours)

### Reference:

1. J.E.BOOTH, 3<sup>rd</sup> Edition 1986, Principles of Textile Testing, 4<sup>th</sup> Edition 1994, Butterworth Scientific, London.
2. E.B. Groover and D.S, Hamby., 1<sup>st</sup> U.S. Edition 1960. Hand Book of Textile Testing and Quality Control., Wiley Eastern Reprint 1988, Published by Mohinder Singh Sejwal (for Wiley Eastern Ltd) New Delhi, India.
3. V. Sundaram and R.L.N. Iyengar 1968, Hand Book of Methods of Test for Cotton Fibres, Yarns and Fabrics Edition - CTRL, Mumbai.
4. The Characteristics of Raw Cotton - E. Lord, Vol.II Part - I in the series Manual of Cotton Spinning, 1961 Edition, The Textile Institute and Butterworths, England.
5. ISI Hand book of Textile Testing.....SP, 15 - 1981, First Edition, 1982, Indian Standard Institution, New Delhi, India.
6. Methods of Test for Textiles - B.S. Hand book No.11, 1963 or B.S. Hand book No.12.1974 - British Standards Institution, London, England.
7. Gupta & Kapoor: S. Statistical Methods, Chand & Co., New Delhi.
8. A., Brearley & D.R.Cox., 8<sup>th</sup> Editions, 1974, An Outline of statistical methods for use in the Textile Industry., WIRA, LEEDS, U.K.
9. M.R. Spiegel: SI (Metric) Editions 1972: Theory and Problems of Statistics - SCHAUM's Outline series - McGraw - Hill International Book Company, New York. London, etc.
10. P. Angappan & R.Gopalakrishnan, Textile testing -, 4<sup>th</sup> revised edition 1997, SSMITT Students Co Operative Stores, Kumarapalayam.

**15RIMD0206: TEXTILE TESTING & QUALITY ASSURANCE - PRACTICAL**

(No of Hours: 4 Credit: 2 CFA: 75; ESE: 25)

**Objectives:** To understand the relation of moisture with Textile - The principal and methods of testing the fibres, Yarn & Fabric to determine their basic characteristics - The application of statistical methods on textile

**Learning outcome:**

Students have been exposed in predicting the Fibre, yarn, and Fabric properties and its specifications.

Understand the Testing methods in Textile products.

**PRACTICAL**

1. Determination of effective length, mean length, percentages of short fibres and percentage of dispersion using Baer sorter.
2. Determination of fibre fineness using micronaire fibre fineness tester.
3. Determination of fibre maturity by caustic soda method.
4. Determination of fibre bundle strength using stelometer.
5. Determination of yarn count and its CV% using wrap reel.
6. Determination of lea strength using pendulum lever type tester
7. Determination of twist in single yarn and double yarn .
8. Preparation of yarn on the black board and grading the yarn based on ASTM standard.
9. Determination of quality particulars of a given fabric.
10. Determination of tensile strength and tearing strength of a fabric.
11. Determination of crease recovery of fabric.
12. Determination of stiffness of fabric.
13. Determination of crimp % in warp and weft threads removed from woven fabric.

**15RIMD0301: FABRIC MANUFACTURE - III - THEORY**

(No of Hours: 3      Credit: 3      CFA: 40; ESE: 60)

**Objectives:** To understand about the weaving techniques of various Handlooms of India - Dobby and Jacquard mechanisms on Handloom & Power loom - Mechanisms of Auto looms and shuttle less looms

**Learning outcome:**

To keep the students to identify the various technical features of Hand looms, power looms and shuttle less looms.

Understand the timing and setting for various loom mechanisms.

**Unit: 1 Handlooms of India**

Detailed study of Banarasi loom and system of ornamenting the fabric by adopting Jala technique. Detailed study of Kancheepuram loom and system of ornamenting the fabric by adopting adai technique. Detailed study of Mavu loom and its techniques. Detailed study of Real Madras hand kerchief loom. Detailed study of important handlooms like loin loom, salem loom, venkatagri loom. Study of Chandila, Jamthani, Malabar, Panipat, Nagpur, Bijanur, Chanderi, Gadwal, Himroo and Solapur looms. (10 Hours)

**Unit: 2 Dobbies**

Additional mechanism on handlooms like long length weaving device, roller temple, fly wheel, 5 wheel take-up, frictional let-off and terry motion. Types of handloom dobbies - working principle of bottom closed shed doobby, centre closed shed doobby, barrel doobby and lattice doobby. Powerloom dobbies - cross border doobbies, Keighly and Claimax doobbies. Common defects and their remedies in doobby wearing. (10 Hours)

**Unit: 3 Jacquard**

Study of single lift single cylinder jacquard. Study of double lift single cylinder and double lift double cylinder jacquards. Study of open shed, centre shed and cross border jacquards. Different system of harness mounting and their use, harness building, Defective shedding in jacquard weaving (10 Hours)

**Unit: 4 Harness Mounting**

Different types of tie-ups made in harness mounting- straight, centre, border and mixed, sectional or compound tie - Calculations pertaining to jacquard, Study of card cutting devices - hand punching and piano card cutting machine, method of punching cards on these machine and card lacing (8 Hours)

**Unit:5 Automatic power loom and shuttle less loom**

Introduction of automatic powerloom and shuttle -less loom and their merits. (10 Hours)

**Reference**

1. Lord P.R. and Mohamed M.H., Weaving: Conversion of Yarn to Fabric, Merrow Publications, 1992.
2. Chakravorthy B., Mechanism of Weaving Machines, Smt.Chakravorthy serampore W.B.1982.
3. Ormerod, Modern Preparation and Weaving, Butterworths & Co. Ltd., 1983.
4. Talavasek O. & Svaty V., Shuttleless Weaving Machines, Elsevier Scientific Pub. Co., New York 1981.



**15RIMD0302: FABRIC MANUFACTURE - III PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives:** To practice weaving in Handlooms - use of Dobby and Jacquard mechanisms on Handloom & Powerlooms - Mechanisms on Auto looms and Shuttleless looms.

**Learning outcome:**

To keep the students to weave various designs in Hand loom, power loom and shuttleless loom. Understand the timing and setting for various loom mechanism.

**PRACTICAL**

**Dobby**

1. Practice to mount and set the doobby over the loom on handloom & powerloom.
2. Practice to dismantle and assemble jacks, bauck lever, needle, hooks etc.
3. Practice to assemble and set the T lever, L lever, knives etc.
4. Practice to tune the given doobby.
5. Practice to assemble and set the cylinder.
6. Practice to peg a design on lattice and mount on the cylinder.

**Jacquard**

7. Practice of hooks and needles arrangement in the jacquard.
8. Practice on driving arrangement for cylinder and griffe in jacquard.
9. Preparation of motif and graph design for doobby weaving to produce sarees and dhoties, pegging on lattice, mounting and weaving in doobby loom.
10. Preparation of suitable motif, graph enlargement, binding mark of different furnishing fabric.
11. Practice in harness building on jacquard loom to produce furnishing fabrics.
12. Practice in card cutting, on pattern cards for the given designs using hand punching and pedal punching machine. Mounting of these cards on jacquard loom.
13. Weaving practice on jacquard loom.

**15RIMD0303: TEXTILE WET PROCESSING - I - THEORY**

(No of Hours: 3    Credit: 3    CFA: 40; ESE: 60)

**Objectives:** To understand the preparatory process of grey fabric - methods of applications of different process of dyeing and printing on cotton materials.

**Learning outcome:**

Students have been exposed in the significance of water, removal of impurities from raw cotton, process of methods of dyeing and printing.

**Unit: 1 Water and Cotton for dye house**

Requirement of water for dye house - hard and soft water - carbonate and non-carbonate hardness - expression of hardness - removal of impurities - water softening - cation exchange softening - lime soda treatment - softening by sequestering agents - estimation of hardness. Structure and properties of cotton - impurities present in grey cotton - grey checking - stitching - shearing and cropping - singeing - object - process of singeing on gas singeing machine.

(10 Hours)

**Unit: 2 Desizing and Scouring of cotton**

Desizing of cotton fabric - object - starch based size by hydrolytic and oxidative desizing - desizing of synthetic size - merits and demerit of each method. Scouring of cotton - Fibre, yarn and fabric - object - different methods of scouring - defects and remedies - machinery like kier, jigger, etc.

(10 Hours)

**Unit: 3 Bleaching and Mercerization of Cotton**

Bleaching of cotton - object - bleaching with calcium hypochlorite - sodium hypochlorite - hydrogen peroxide - concept of full bleaching and use of blueing agents and optical brightening agents - evaluation of bleaching, damages and defects caused by bleaching. Mercerizing of cotton - yarn and fabric - physical and chemical aspects of mercerization - factors determining the efficiency of mercerization - mercerizing machinery.

(10 Hours)

**Unit: 4 Dyeing on cotton**

Dyeing - object - general theory of dyeing - classification of dyes based on their mode of application - procedure for application of direct dyes, vat dyes, solubilised vat dyes, azoic dyes, sulphur dyes and reactive dyes on cotton - dyeing machinery.

(10 Hours)

**Unit: 5 Printing on cotton**

Printing - object - methods of printing - styles of printing - printing procedures of cotton fabric with various classes of dyes and pigments - printing machinery.

(8 Hours)

**References**

1. Dr.V.A. Shenai, *Textile Fibres*, Sevak Publications, Mumbai. (2002)
2. Dr.V.A. Shenai, *Technology of Bleaching and Mercerising*, Sevak Publications, Mumbai. (2002)
3. Dr.V.A. Shenai, *Technology of Dyeing*, Sevak Publications, Mumbai. (2002)
4. Dr.V.A. Shenai, *Technology of Printing*, Sevak Publications, Mumbai. (2002)
5. J.T. Marsh, *An Introduction to Textile Bleaching*, B.I. Publications, New Delhi. (1996)
6. J.T. Marsh, *Mercerising*, B.I. Publications, New Delhi. (2006)
7. E.R. Trotman and B.I. Griffin, *Chemical Technology of Scouring and Bleaching*, B.I. Publications, New Delhi. (1990)
8. E.R. Trotman and B.I. Griffin, *Dyeing and Chemical Technology of Textile Fibres*, B.I. Publications, New Delhi. (1990)
9. R.S. Prayag, *Bleaching, Mercerising and Dyeing of Cotton Materials*, Mrs.L.R. Prayag, Dharwad. (1992).

**15RIMD0304: TEXTILE WET PROCESSING - I PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives:** To understand the preparatory process of grey fabric, methods of applications of different process of dyeing and printing on cotton materials.

**Learning outcome:**

Students have been exposed in the significance of water for textile wet processing, removal of impurities from raw cotton, process of dyeing and printing using various dye sources.

**PRACTICAL**

1. Estimation of water hardness.
2. Desizing of cotton fabric with enzyme.
3. Scouring of cotton yarn and fabric with caustic soda.
4. Bleaching of cotton yarn and fabric with calcium hypochlorite.
5. Bleaching of cotton yarn and fabric with sodium hypochlorite
6. Bleaching of cotton yarn and fabric with hydrogen peroxide.
7. Application of optical brightening agents.
8. Slack mercerization of cotton yarn and fabric.
9. Dyeing of cotton yarn and fabric with direct dyes and reactive dyes.
10. Dyeing of cotton yarn and fabric with vat dyes and solubilised vat dyes.
11. Dyeing of cotton yarn and fabric with azoic dyes and sulphur dyes.
12. Dyeing of cotton yarn and fabric with.
13. Printing of cotton with reactive dyes, vat dyes and pigment dyes.
14. Batik printing, Screen preparation.

**15RIMD0305: FABRIC STRUCTURE AND COLOUR - THEORY**

(No of Hours: 3    Credit: 3    CFA: 40; ESE: 60)

**Objectives:** To know about the construction of basic weaves like plain, twill, sateen and other furnishing - color theories and their application on Textiles

**Learning outcome:**

- Students have been exposed in the principle construction of interlacement of different types of various textile fabrics

**Unit: I Plain Weave**

Elementary principle of fabric construction - design, draft, peg plan and denting plan - Design paper and its use - Various kinds of draft and their uses - Preparation of peg plan from given design. Plain weave - Characteristics, Construction and Ornamentation - Derivations of plain weave - construction and uses. (8 Hours)

**Unit: II Twill Weave**

Characteristics of Twill weave, different types of twill weaves - regular twill, pointed twill, herring bone twill, broken twill, combined twill, elongated twill, transpose twill. Miscellaneous elementary weaves - Barley corn weaves stitched hopsack, Twilled hopsack. (12 Hours)

**Unit: III Sateen Crepe and Diamond Weaves**

Sateen weaves - regular sateen and Irregular sateen - construction and uses, Crepe weaves - construction and its specialties, Diamond weave - methods and their construction. (8 Hours)

**Unit: IV Towel and Furnishing Weaves**

Honey comb - characteristics, construction of ordinary and brighten honey comb weaves. Huck-a-back and mock leno weaves - characteristics, construction and uses. Terry weaves - formation of pile, construction of weaves, ornamentation to form stipe and check effect. Bedford cord, pique and Double cloth - construction and their specialties (8 Hours)

**Unit: V Colour for Textile Designing**

Elements of colour - light and colour phenomena, Theory of colours - light and pigment Colour in combination, colour contrast and colour harmony. Application of colours - mixed colour effects, fibre mixture yarn, twist yarn mixture, combination of differently coloured thread, colour strip and check, simple and irregular pattern, colour combination in relations to weave. Introduction of Computer Application in Textile Designing. (12 Hours)

**Reference**

1. Grosicki Z.J, "Textile Design and Colour" - Butterworths London, 1950.
2. Grosicki Z.J, "Advanced Textile Design & Colour" Butterworths, London, 1952
3. Goerner D, "Woven Structure and Design", Part - I - WIRA, 1986.
4. Goerner D, "Woven Structure and Design", Part - II - BTT6 - 1989.

**15RIMD0306: FABRIC ANALYSIS AND DESIGN & COLOUR - PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives:** To have knowledge in the construction of simple and compound fabrics - color application on Textiles.

**Learning outcome:**

Students of this course have been trained in analyzing various technical aspects of different textile fabrics for its reproduction. Also trained them in the application of color in textile fabrics for its various ornamentation. Students can under take the production of various textile fabrics.

**PRACTICAL****Fabric Analysis**

General principle of cloth analysis, analysis of fabric for all manufacturing particulars and detailed study of techniques adopted in weaving of the fabric like plain, twill, sateen, and their derivatives, crepe, Huck-a-back, spider, mock leno, diamond, terry, Bedford cord, pique.

**Design & Colour**

1. Preparation of chromatic and pigment colour circle, shades and hues, colour in combination, harmony in colour combination, contrast or complementary colours.
2. Preparation of pattern on colour and weave effects strip effect, shot effect, solid effect, spotted effect, check effect.
3. Pattern preparations of designs based on natural, conventional and abstract forms.
4. Preparation of simple, regular and irregular patterns for jacquard weaving.
5. Practicing the design based on different forms of layout in colours for saree borders.
6. Practice in planning the designs, placement, repeats, transferring designs for jacquard furnishing.
7. Design practice on traditional motifs in Kalam Kari and folk style, etc.
8. Practice in creating basic computer designing
9. Design and development of stripes and checks using textile CAD.

**15RIMD03E1: TECHNOLOGY OF SILK - THEORY**

(No of Hours: 3 Credit: 3 CFA: 40; ESE: 60)

**Objectives:** To have knowledge about the Production, Reeling, Throwing, Dyeing, Printing and Finishing of Silk materials

**Learning outcome:**

Students have been exposed in the field of sericulture from soil to fabric and in textile processing of dyeing and printing. Students are motivated to perform in various industries of silk production units such as sericulture, reeling & twisting, weaving, dyeing and printing units.

**Unit: 1 Silk production**

Production of silk - life cycle of silk worm, silk worm eggs, silk worm rearing, temperature and humidity, mounting and harvesting. Physical and commercial cocoon quality Defects in cocoon.

**Unit: 2 Silk Reeling**

Selection of raw material for reeling - scientific method of testing and classification. Stifling of cocoons and its methods - sun drying, steam stifling, barrel steaming, chamber steaming. Cocoon boiling and brushing. Reeling operation, importance of good water for reeling; silk examination, lacing and skeining. Physical and chemical structure, properties of silk and types of silk. (8 Hours)

**Unit: 3 Silk throwing, Testing & Weaving**

Silk throwing - object, winding, doubling, twisting, re-winding, preparation of fancy yarn - crepe, georgette, gold zari thread. Raw silk testing and classification - object, advantages. Types of test - standard testing appliances and equipments - winding frame, sizing reel, balance scale, seriplane, cohesion test, serigraph, conditioning oven. Weaving - preparatory process - warping, pirn winding, handloom and powerloom for silk weaving, weaving defects. (8 Hours)

**Unit: 4 Dyeing of Silk**

**Pretreatment of Silk:** Degumming and desizing - General - Degumming bombyx mori silk - pretreatment of tussar silk - methods of testing degumming in practice - Degumming machines - degumming faults. Bleaching and fluorescent brightening - Reductive bleaching - Oxidative bleaching - Fluorescent brightening - Bleaching faults weighting - General - Weighting methods. **Dyeing of Silk:** Dyeing properties - Dye classes for dyeing and printing silk: Acid and metal complex dyes, Reactive dyes, other dye classes - Dyeing and after treatment of pure silk: Dyeing with acid and metal complex dyes, exhaust dyeing with reactive dyes, exhaust dyeing with other dye classes, pad batch method with reactive dyes, After treatment for improving wet fastness properties, causes and possibilities of faults - machines for dyeing silk: yarn dyeing, Ribbon dyeing, Piece dyeing - Dyeing blends of silk with other synthetic fibres. (12 Hours)

**Unit: 5 Printing and Finishing of Silk**

Processing technology: printing techniques, fixing the dyes, washing off printed fabrics, Drying - Dye classes used - Direct printing: prints with acid, metal complex and direct dyes, prints with reactive dyes - Discharge printing: Survey of discharge processes, Recipe for white and coloured discharges, steaming the prints, washing off prints - Resist printing: Principle of the process, printing pastes, fixing, washing off the prints - Technical behaviour of tussar silk - printing of blended woven fabrics - causes of faults.

**Fundamentals of silk finishing :** machines - Finishing chemicals: Scroopy handle, Novel finishes e.g. Soft-full handle finish, spot resistant finish, oil and water repellent elastic finish. (12 Hours)

**Reference**

1. Gulrajani M.L, Silk dyeing, printing and finishing III, Delhi, 1988.
2. Gulrajani M.L., Silk Technology III, Delhi, 1988.
3. William F. Leggett. The story of silk, life time edition, 1949.
4. Trotman E.R, Dyeing and Chemical Technology of Textile fibre.
5. Krishnasamy S, Sericulture manual I - Mulberry cultivation, Central Silk Board, Bangalore. (1990)
6. Krishnasamy S, Sericulture manual II - Silk worm rearing, Central Silk Board, Bangalore. (1990)
7. Krishnasamy S, Sericulture manual III - Silk worm reeling, Central Silk Board, Bangalore. (1990)

**15RIMDO3E2: TECHNOLOGY OF SILK - PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives:** To have knowledge about the Cultivation, Reeling, Throwing , Dyeing , Printing and Finishing of Silk materials

**Learning outcome:**

Students can experiment in the field of sericulture, silk yarn to fabric and in textile processing of dyeing and printing. Students are motivated to perform in various industries of silk production units such as sericulture, reeling & twisting, weaving, dyeing and printing and to become an entrepreneur in the field.

**PRACTICAL**

1. Practice in rearing of silk worm eggs.
2. Practice in selection and scientific method of testing of cocoons - cocoon sorting, cooking and brushing and reeling.
3. Practice in winding of silk thread - winding, doubling, twisting and preparation of fancy silk yarn.
4. Practice in silk examination, lacing and skein making.
5. Practice in silk yarn testing for Denier-testing with seriplane, inspection board, serigraph.
6. Practice in preparing warp for silk weaving, pirn winding.
7. Practice in weaving of silk handloom and powerloom.
8.
  - a) Practice in degumming and bleaching of silk fabric. Application of optical whitening agents.
  - b) Practice in dyeing of silk and silk blended fabric with Acid and Metal complex dyes.
  - c) Practice in printing of silk fabric using direct, discharge and resist styles.
  - d) Practice in finishing of silk fabrics.
  - e) Practice in identification of gold zari thread and its testing.

**15RIMDO3E3: GARMENT TECHNOLOGY - THEORY**

(No of Hours: 3      Credit: 3      CFA: 40; ESE: 60)

**Objectives:** To understand about the basic tools , cutting preparation , pattern construction , surface ornamentation and embroidery work for making garments out of fabrics.

**Learning outcome:**

- Understand the fundamentals of Garment production
- Predict the value addition methods in Garmenting
- Methods of cutting and operation of sewing machineries.
- Understand the ornamentation methods in garment construction.

**Unit I Tools and Machines**

Basic garment production systems - Brief study, Basic tools, their uses, care operation and maintenance of garment, making machines. Hand cutters and Power cutters. Sewing m/c mechanisms - Variations in feeding devices. Basic and decorative stitches; Seams and hem finishes - Temporary and permanent stitches. (10 Hours)

**Unit II Production Systems**

Evaluation of fabric quality - Receiving and inspecting materials - Types of fabric effects - Fabric grading - common fabric problem for apparel manufacturers. Apparel production systems - Basic concepts - Flexible Manufacturing - work flow - Balancing, Buffer, Plant layout - Product oriented layout, Process oriented layout - Progressing bundle System (PBS) - Unit Production System (UPS) - Modular Production System (MPS) - Team Training (10 Hours)

**Unit III Pattern Construction**

Drafting and construction of standard dress materials for men and women; Zabla, petticoat, frock, salwar and kamees T-shirts, shorts, trousers and safaris, sewing and assembling of garments. (10 Hours)

**Unit IV embroidery Work**

Techniques and scope. Different types of embroidery machines. Basic stitches in machine embroidery, First stitches, cording, eyelet, round and satin stitches. Computerised embroidery work - Brief study. (10 Hours)

**Unit V Surface Ornamentation**

Miscellaneous work in embroidery - appliqué work - Patch work and cut work. Smoking, crochet work, Bead work. Embroidered lac work, its implements; selection and use of materials. (8 Hours)

**References**

1. Jacob Solinger., “ Apparel Manufacturing Handbook”, VanNostrand ReinholdCompany (2002).
2. Ruth E.Glock, Grace I.Kunz, Apparel Manufacturing Sewn Product Analysis,Blackwell Scientific Publications. (2000).
3. Gerry Cooklin - Pattern Grading Blackwell, Scientific publication (2002).



**15RIMDO3E4: GARMENT TECHNOLOGY - PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives:** To understand about the basic tools , cutting preparation , pattern construction , surface ornamentation and embroidery work for making Garments on Textile Fabrics

**Learning outcome:**

- Understand the fundamentals of Garment production
- Practicing the value addition methods in Garmenting
- Practicing methods of cutting and use of sewing machineries.
- Understand the ornamentation methods in Garment construction.

**PRACTICAL**

1. Measurement Techniques
2. Sewing practice through paper and fabric
3. Pattern making for men's shirt
4. Stitch and seam preparation
5. Construction of garments components
6. Construction of men's shirt

**15RIMDO3E5: ADVANCED FABRIC MANUFACTURE -THEORY**

(No of Hours: 3      Credit: 3      CFA: 40; ESE: 60)

**Objectives:** To understand the mechanisms of auto powerlooms - shuttleless loom like projectile , Ravier , Circular , Jet and Multiphase looms

**Learning outcome:**

- Under stand basic weaving mechanism and indentify the various technical features of Auto loom and shuttleless looms.
- Understand the timing and setting for various loom mechanisms.

**Unit: 1 Introduction of Automatic Loom**

Characteristic feature, advantage over non-automatic loom. Weft feelers - types-mechanical and electric feelers - working, timing and setting. Warp stop motion-object-types-principles-types of drop wires. Mechanical, electrical warp stop motion-working-merit and demerits.

(8 Hours)

**Unit: 2 Motions in Automatic Loom**

Cop changing mechanism - working, timing and setting. Study of weft thread cutters-shuttle protector. Positive warp let-off motion - objects - types - uses - roper let-off motion - working - timing and setting. Shuttle changing loom - working - comparative study of cop changing and shuttle changing loom.

(10 Hours)

**Unit: 3 Introduction of Shuttle less and Projectile weaving**

Preparation of warp for shuttles weaving - Advantage and disadvantage of shuttles weaving machine-classification. Projectile weaving machine-study of torsion bar picking - cam beat up. Stages of weft insertion system in projectile weaving

(10 Hours)

**Unit: 4 Rapiers and Circular Weaving**

Ravier loom - principle - types and Study of flexible and rigid rapier ,drive Method of weft insertion system. Brief study about circular weaving machine

(10 Hours)

**Unit: 5 Jet looms and Multi Phase looms**

Jet looms - types - principles - hydraulic picking for water jet looms. Study of Air jet loom - study of weft measuring device - study of weft selection mechanism. Study of multi phase loom. Salient features of shuttles looms - scope and limitation study of leno, tuck-in and melted selvedge.

(10 Hours)

**References**

1. Lord P.R. and Mohamed M.H., Weaving: Conversion of Yarn to Fabric, Merrow Publications, 1992.
2. Chakravorthy B., Mechanism of Weaving Machines, Smt.Chakravorthy serampore W.B.1982.
3. Ormerod, Modern Preparation and Weaving, Butterworths & Co. Ltd., 1983.
4. Talavasek O. & Svaty V., Shuttleless Weaving Machines, Elsevier Scientific Pub. Co., New York 1981.
5. Adanur S., Handbook of Weaving, Technomic Publishing Co., Inc., 2001.

**15RIMDO3E6: ADVANCED FABRIC MANUFACTURE PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives:** To understand the mechanisms of auto powerlooms - shuttleless loom like projectile , Rapier , Circular , Jet and Multiphase looms

**Learning outcome:**

- Knowledge on basic weaving mechanism and identify the various technical features of Auto power loom and shuttles loom.
- Understand the timing and setting for various loom mechanisms.

**PRACTICAL**

1. Assembling and setting of mechanical weft feeler in cop changing mechanism.
2. Setting the warp stop motion on automatic loom for correct working.
3. Assembling the part of positive let-off motion in automatic loom.
4. Study of method of preparing warp for shuttles weaving.
5. Setting of the torsion bar picking on projectile loom.
6. Study of the passage of weft insertion on projectile loom weaving.
7. Study of driving mechanism on rapier weaving.
8. Study of the passage of weft insertion on rapier weaving.
9. Setting of shuttle driving mechanism on circular weaving.
10. Study of hydraulic picking mechanism on water jet loom.
11. Setting of weft measuring device on air jet loom.
12. Study and setting of different mechanism of selvedge formation on shuttle less loom.

**15RIMDO3E7: MERCHANDIZING AND EXPORT MARKETING- THEORY**

(No of Hours: 3      Credit: 3      CFA: 40; ESE: 60)

**Objectives:** To know marketing environment, export documentation, costing and production planning of various Textile products.

**Learning outcome:**

- Understand the Garment Marketing environment
- Understand the Export documentation
- Understand the Garment costing and production planning.

**Unit I -Basics Concepts of Marketing & Its Evolution**

Basics of marketing - need, wants, demands, product, exchange of satisfaction - market, marketing management - marketing philosophies and challenges ahead - need for export marketing.

(8 Hours)

**Unit II - Marketing Environment, Segmentation & Buyer Behaviour**

Marketing firm's micro environment, macro environment and responding to these - Market segmentation - bases of segmentation - criteria for effective segment selection strategies - consumer behaviour - buying roles - buyer decision process - segmentation of USA, UK & other European market.

(10 Hours)

**Unit III - Marketing Mix I: Product and Pricing for Exports**

Components of marketing mix - selection of product for exports - basis - product strategy: product brand, package, services - new product - product life cycle analysis - product line and levels - pricing considerations - product mix, adjustment pricings - price changes. Impact of OS and values.

(8 Hours)

**Unit IV - Marketing Mix II: Place and Promotion in Export Merchandizing**

Nature, importance and behaviour of distribution channels - retailing and whole sale management - advertising - copy, media, budget, sales promotion, public relations and personal selling.

Export business negotiations - stages - buying agent, foreign agent, fixing commission, selection & appointment of agent ,samples for exports, export contract, processing of export order - (acknowledgement, scrutiny, confirmation & classification, reservation of shipping space).

(12 Hours)

**Unit V - Export Market Identification & Indian Textile Market**

Market research - identification of textile product for exports - buyer, seller meet - trade delegation - seminar & workshops, journal - fair & exhibition - fashion forecast & trend information of market intelligence - Director General of Commercial Intelligence and Statistics - its publications. India textile Policy & Exports Import Policy - Organization helpful for export, marketing - objective of the following Ministry of Commerce, Ministry of Textiles & Jute Export Promotion Councils - Textile Commissioner - PDEXCIL - AEPC.

(10 Hours)

**References**

1. Elaine Stone, Jean A. Samples, "Fashion Merchandising", McGraw-Hill Book Company (1985), ISBN: 0-07-061742-2.
2. S.Shivaramu. "Export Marketing" - A Practical Guide to Exporters", Wheeler Publishing (1996), ISBN: 81-7544-166-6.
3. D. Sinha, "Export Planning and Promotion", IIM, Calcutta (1989).
4. Tuhin K. Nandi, "Import-Export Finance", IIM, Calcutta (1989).
5. J.A. Jarnow, M.Guerreiro, B.Judelle, "Inside the Fashion Business", MacMillan Publishing Company (1987), ISBN: 0-02-360000-4.

**15RIMDO3E8: MERCHANDIZING AND EXPORT MARKETING PRACTICAL**

(No of Hours: 4      Credit: 2      CFA: 75; ESE: 25)

**Objectives:** To know marketing environment, export documentation, costing and production planning of various textile products.

**Learning outcome:**

- Survey the Garment Marketing environment
- Export documentation methods
- Understand the Garment costing and production planning.

**PRACTICAL**

Visit to export houses and preparing case study reports on

1. Market segmentation in respect of textile exports
2. Pricing methodologies for various textile goods
3. Product promotion strategies adopted and in buyer-seller meet.
4. Preparing exhibitions sales in trade expos
5. Processing of Export orders
6. Banking transactions for export orders
7. Report on Export Promotion Councils.

**15RIMDO307: SUMMER INPLANT TRAINING EVALUATION****(A Compulsory Training Course)**

(Credit: 2      Marks 100)

Students will undergo in plant training during summer vacation and the marks will be awarded in the third semester under summer in plant training evaluation course.

The students will study the processing, quality aspects, marketing and other details in respect of any spinning mill, weaving unit, Dying & Printing unit or any garment units.

The evaluation will be based on

Attendance	- 20%
Report Submission	-50%
Viva-voce	- 30%
Total	<b>100%</b>

**15EXNPO3V1: VILLAGE PLACEMENT PROGRAMME**

(Credit: 2      CFA: 50 ESE: 0)

**Objectives**

To train the students to acquire skills in data collection methods, organizing rural people, conducting need based programmes, establishing collaborations with institutions and organizations of similar interest.

**Learning outcome**

The students would have acquired skills in  
Interviewing  
Data collection  
Conducting case studies  
Organizing people and conducting meetings  
Establish linkages and collaborations with institutions and organizations  
Documenting information.

They would have also gained enhanced social awareness and developed an attitude towards contributing to the society.

**Course contents**

- Appraisal and economic conditions of villages - PRA methods - surveys
- Understating and analyzing resource base and occupational pattern.
- Assessing mobilities and linkages
- Documentation of Rural Ins and Rural outs
- Case studies on
  - CPR
  - Rural economic organization/entities
  - Rural community based organizations
  - Educational institutions
  - Religious institutions
- Budget analysis of local bodies
- Campaigns on thrifts and savings
- Awareness programme on organic farming, marketing of agricultural produces, value addition
- Sensitization sessions on rural business / livelihood opportunities
- Documentation and sharing.

**Evaluation**

This is a field base practical course. Evaluation will be done by the faculty-in-charge of VPP based on students participation in field work and its documentation.

**15RIMD0401: ENVIRONMENTAL ENGINEERING IN TEXTILE INDUSTRY**

(No of Hours: 3      Credit: 3      CFA:40; ESE:60)

**Objectives:** To understand about the influence of water, air and other pollution, green house effects - waste management and its prediction

**Learning outcome:**

- Understand the influence of water pollution due to textile effluents
- Under the green house effects and its caused in Textile processing.
- Understand the waste management principles.
- Understand the air pollution ways due to textile processing.
- Learn the waste management methods and design the ETP plant for Textile Industry.

**Unit I water in Textile Wet Processing units**

Physical, chemical and biological characteristics of water - water analysis - IS and WHO standards - Requirements of water supply - Role of water in Textile Wet Processing units.  
(10 Hours)

**Unit II water treatment**

Treatment plants - process of treatments - mixing, aeration, sedimentation, coagulation, filtration, disinfection, softening - advanced water treatment.  
(10 Hours)

**Unit III Toxic and hazardous wastes**

Equalization and neutralization - biological degradation - recycle and reuse of waste effluents - treatment of industrial wastes - spinning units, weaving units, wet processing units and garment units.  
(10 Hours)

**Unit IV Air Pollution**

Air pollution -dust collection - cellars and rotary filters - stack emission - automobile exhaust - green house gases - its impact on environment - control devices.  
(8 Hours)

**Unit V Solid waste**

Solid waste - characteristics - disposal - composting - anaerobic and aerobic digestion - combustion - incineration -energy recovery & management related to textile units -Noise pollution - standards - laws - methods to control noise pollution in spinning, weaving units and garment units.  
(10 Hours)

**References**

1. S.K.Garg, *Water Supply Engineering*, Khanna Publishers, New Delhi, 2006.
2. G.S.Birdie and Birdie, *Water Supply and Sanitary Engineering*, Dhanpat Rai & Sons, New Delhi, 2005.
3. K.N.Duggal, *Elements of Public Health Engineering*, S.Chand & Co, New Delhi, 2006.



**15RIMDO402: TEXTILE MANAGEMENT AND ENTREPRENEURSHIP**

(No. of Hours: 3 Credit: 3 CFA:40;ESE:60))

**Objectives:** To have knowledge about organisation & planning, production, financial management, personel, Industrial psychology & safety and entrepreneurship development.

**Learning outcome:**

- Understand the Management principles adopted in Textile Industry.
- Understand the costing, working capital, profit loss accounting in Textile Industry.
- Understand work study and Time study concepts
- Understand the entrepreneurship avenues in Textile Industry

**Unit - I Organisation and Planning**

Organisation - definition - Different types of organization structure - Line type, Line & Staff type, Functional type. Relative merits and demerits. Organisation chart of a Textile unit.

Factors considered in Selection of site for a textile unit. Different types of Building structures for a textile units. Importance of Lighting. Requirements of lighting in different section of a Textile units. Control of Air pollution in different sections of a textile unit.

Layout machines in different sections of a textile unit. Material handling equipment employed in different sections of a textile unit. (10 Hours)

**Unit - II Production and Financial Management**

Objectives of Work study. Method study and Work measurement. Purchasing - methods of purchase - role of purchase manager - Inventory control - definition and objectives. production planning and control. Functions of PP & C Department - pre-planning, routing, scheduling, dispatching, controlling, Brief idea about Capital cost and Working capital. Importance and objectives of costing. Elements of cost. Determination of selling price. Break even chart. Definition and objectives of Depreciation. (10 Hours)

**Unit - III Personal Management**

Importance and duties of Personal management. Elementary idea. Sources of recruitment. Selection procedure for employees. Objectives of training. Different methods of training for a supervisor in a textile mill. Wages and its components. Different methods of wage payment. Incentives and its objectives. Labour welfare activities and their objectives. Role of labour welfare officer. Grievance and Grievance procedure. Causes and consequences of Industrial dispute. Mechanism for settlement. (10 Hours)

**Unit - IV Factory Act, Industrial Safety**

Factory act 1948 pertaining to Health, Cleanliness, Ventilation, Safety, Welfare, Working hours, and Accident Compensation. Importance, Causes and consequences of Industrial accidents. Steps to bring down accidents. Guards and safety devices used in a Textile Mill. Fire prevention and control. (8 Hours)

**Unit - V Entrepreneurship Development**

Definition of Entrepreneur - characteristics and function of an entrepreneur. Entrepreneurship Development Programme. Role of education and training in EDP. Ideas about project identification. Role of trade fairs and exhibitions. Criteria for selection a project. Study of feasibility report. Role of Commercial Banks and other financial institutions in EDP. Functions of District Industries Centers (DIC). Brief idea about functions of Small Industries Service Institute (SISI), SIPCOT, TIIC and ITCOT. Definition of small-scale industry. Government concessions and encouragement to small-scale industry. Procedure for registration of SSI units. (10 Hours)

**Reference Books**

1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, 2007.
3. Dudega V.D - Management of textile Trade press, Textile Industry, A/3 Tagore flats Ahmedabad.
4. Ormerod, A. - Management of Textile Production, 1979 by Butterworth & Company. Banga.T.R.ETAL - Industrial Engineering & Management Science, 1979.
5. Singa, J.C & Mugali, V.N - Business Management: Theory and Practice, Edition 5, 1982.
6. Saravanavel. P. - Entrepreneurial development - principles, policies and programmes, 1987.

**15RIMDO403:TEXTILE WET PROCESSING - II - THEORY**

(No. of Hours:3 Credit: 3 CFA:40; ESE:60))

**Objectives:** To acquire knowledge in the application of various classes of dyes, prints and finishes on viscose, silk, polyester and their blends assess - fastness properties - Effluent and Eco - Friendly processing

**Learning outcome:**

Remove impurities from silk, wool, viscose rayon, acrylic and polyester before dyeing, printing and finishing

Dye viscose rayon with direct, vat, azoic and reactive dyes

Dye silk and wool with acid and metal complex dyes.

Dye polyester/cotton blend

Print silk, wool, viscose rayon, acrylic and polyester with suitable classes of dyes by different methods and styles.

Apply finishes to cotton, viscose rayon, silk, wool, polyester and acrylic for specific end-uses

Evaluated colour fastness of colored textiles to washing, rubbing, light and perspiration

Treat effluent from textile wet processing

Understand pollutants of textile industry.

Understand eco-friendly processing, banned dyes and chemicals and various international certification agencies

**Unit: 1 Introduction of Fibres and their Pre-Treatments**

Structure and properties of silk, wool, viscose rayon, acrylic and polyester - impurities present in these fibres - introduction to various pre treatments such as singeing, desizing, scouring and bleaching. (8 Hours)

**Unit: 2 Dyeing of Textile Materials**

Dyeing of viscose rayon with direct dyes, vat dyes, azoic dyes, and reactive dyes - dyeing of silk and wool with acid and metal complex dyes - dyeing of polyester with disperse dyes - dyeing of polyester / cotton blend - dyeing of acrylic with basic dyes - dyeing machinery. (10 Hours)

**Unit: 3 Printing of Textile Materials**

Printing of silk, wool, viscose rayon, polyester and acrylic fabric with various classes of dyes by different styles of printing - printing machinery. (10 Hours)

**Unit: 4 Finishing of Textile Materials**

Finishing - object - principles of finishing of cotton, viscose rayon, silk, wool, polyester, acrylic and their blends - classification of various finishes - finishing materials: their functions and applications - Finishes: (e.g) Softening, stiff finish, crease resistant, anti-shrink, water repellent, water proof, fire proof, mildew proofing, calendaring, decatizing, milling, weighting of silk, weight reduction of polyester, organdie etc. (10 Hours)

**Unit: 5 Quality Control and Eco-Friendly Processing**

Importance and needs of quality control - determination of colour fastness to various agencies such as washing, rubbing, light and perspiration. Importance and need of environment protection - air, water and noise pollution - constituents and standards of air, water and noise pollutants - brief study about effluent treatment with a suitable plant layout. A brief study on importance of eco-friendly processing - list of banned dyes and chemicals - eco labels: a brief study - ISO 14000 standards: a brief study. (10 Hours)

**References**

1. Dr.V.A.Shenai *Textile Fibres*, Sevak Publications, Mumbai.
2. Dr.V.A.Shenai, *Technology of Bleaching and Mercerising*, Sevak Publications, Mumbai.
3. Dr.V.A.Shenai, *Technology of Dyeing*, Sevak Publications, Mumbai.
4. Dr.V.A.Shenai, *Technology of Printing*, Sevak Publications, Mumbai.
5. E.R. Trotman and B.I. Griffin, *Chemical Technology of Scouring and Bleaching*, B.I. Publications, New Delhi.
6. E.R. Trotman and B.I. Griffin, *Dyeing and Chemical Technology of Textile Fibres*, B.I. Publications, New Delhi.
7. Dr.V.A. Shenai and Dr.N.M. Saraf, *Technology of Finishing*, Sevak Publications, Mumbai.
8. N.Manivasakam, *Treatment of Textile Effluents*, Sakthi Publications, Coimbatore-21.
9. BIS, *Handbook of Textile Testing*, BIS, New Delhi.
10. L.W.C. Miles, *Textile Printing*, Society of Dyers and Colourists, England.

**15RIMDO404: TEXTILE WET PROCESSING- II PRACTICAL**

(No. of Hours: 4      Credit: 2      CFA:75; ESE:25)

**Objectives:** To understand the preparatory process of grey fabric, methods of applications of different process of dyeing and printing on cotton materials.

**Learning outcome:**

Removal of impurities from silk, wool, viscose rayon, acrylic and polyester before dyeing, printing and finishing

Dye viscose rayon with direct, vat, azoic and reactive dyes

Dye silk and wool with acid and metal complex dyes.

Dye polyester/cotton blend

Print silk, wool, viscose rayon, acrylic and polyester with suitable classes of dyes by different methods and styles.

Apply finishes to cotton, viscose rayon, silk, wool, polyester and acrylic for specific end- uses

Evaluated colour fastness of colored textiles to washing, rubbing, light and perspiration

Treat effluent from textile wet processing

Understand pollutants of textile industry.

Understand eco-friendly processing, banned dyes and chemicals and various international certification agencies

**PRACTICAL**

1. Degumming raw silk yarn/fabric.
2. Scouring of wool yarn/fabric and viscose rayon yarn/fabric.
3. Souring of polyester yarn/fabric and Acrylic yarn/fabric.
4. Bleaching of silk with hydrogen peroxide.
5. Bleaching of silk and wool with hydrogen peroxide.
6. Optical brightening of silk and wool.
7. Dyeing of viscose rayon with reactive dyes.
8. Dyeing of silk with acid dyes and metal complex dyes.
9. Dyeing of wool with acid dyes and metal complex dyes.
10. Dyeing of polyester with disperse dyes by carrier method.
11. Dyeing of polyester/cotton blend with disperse/reactive dyes.
12. Dyeing of acrylic with basic dyes
13. Direct style of printing of viscose rayon fabric with reactive dyes.
14. Direct style of printing of silk and wool with acid dyes.
15. Discharge style of printing of silk dyes with /metal complex dyes.
16. Direct style of printing of polyester with disperse dyes.
17. Softening finish on cotton and Water repellent on cotton.
18. Scroop finish on silk.
19. Determination of BOD and COD
20. Determination of acidity and alkalinity
21. Determination of anionic surfactant



**15RIMDO405:COMPUTER AIDED TEXTILE DESIGNING AND COLOUR MATCHING - PRACTICAL**

(No. of Hours: 4 Credit: 2 CFA: 75; ESE: 25)

**Objectives:** To understand the concept of Textile Designing and Color matching techniques through different software in computer.

**Dobby software**

1. Create weavers - Plain twill satten, crepe & other miscellaneous weavers.
2. Dobby designs, draft, Peg plan & its manipulation.
3. Creation of color patters, simulates, print out in real scale.

**Jacquard Software**

4. Practice on Jacquard designing - motif creating, motif scanning, colours & attributes / image editing for graph making scaling, rotating, reversing, dropping, Colour application in motif - masking and protecting, Repeat setting to see joining
5. Method of creating different styles - Butta, Horizontal & vertical all over design, Half drap and half drap reverse design.
6. Preparation of computerized graph design from edited motif with suitable weavers - flout control and float checking - simulation and printout practice on computer aided cond punching.
7. Creation of printing design on computer with colour reduction Technique.

**Computer Aided Colour Matching**

8. File management. - Handling reflectance data.
9. Examining data of different level and editing the data generated.
10. Grouping and ungrouping of colorants on the basis of exhaustion rates, percentage and fastness ratings.
11. Specifying / modifying a match parameters.
12. Colour matching - mixing of colouants and its functions, Batch Correction.
13. Colour difference analysis and fastness ratings.

**Reference**

1. A.D.Sule, Computer Colour Analysis - Textile Applications, New Age International (P) Ltd., Publishers, New Delhi.
2. M.L.Gulrajani (Ed.), Computer Colour Matching, Northern India Textile Research Association, Gaziabad.

**15RIMDO4E9: ADVANCED FABRIC STRUCTURE AND DESIGN- THEORY**

(No. of Hours: 3 Credit: 3 CFA:40; ESE:60))

**Objective:** To understand the principles and construction of various furnishing fabrics and figuring with extra thread, Backed cloth, Pattern sateen, Damask, Double Cloth , Tapestry , Terry and Leno weaves.

**Learning outcome:**

Students of this course have been trained in production of various home textile fabrics by incorporating advance designs.

**Unit: 1 Figuring with Extra Threads**

Principle and methods of introducing extra threads - Disposal of surplus extra threads. Construction of extra warp figuring. Construction of extra weft figuring. Construction of figuring with extra warp and extra weft.

(8 Hours)

**Unit: 2 Backed Cloth and Patent Satin Construction**

purpose, weft backed - cloth construction. Construction of warp backed cloths. Inter changing figured backed cloth construction. Backed cloth with wadding threads. Patent satin structure - Construction and specialities.

(10 Hours)

**Unit: 3 Damasks, Brocades and Double Cloth Construction**

Damasks - construction and specialities. Compound brocades - construction and specialities of multi weft brocades and multi warp brocades. Stitched double cloth construction - classification, self stitched double cloth, centre-stitched double cloth, wadded double cloth. Interchanging double plain cloth and figured double cloth construction. Triple cloth construction

(10 Hours)

**Unit: 4 Tapestries, Leno and Terry Construction**

Simple weft face tapestries construction and its specialities. Gauze and leno structures - principle, leno weave with flat steep doup with an eye - counter leno, Russian cords, net leno weaves. Figured terry fabric, construction of warp pile (velvet) and weft pile (corduroy) fabric.

(10 Hours)

**Unit: 5 Traditional mounting and special jacquard**

Heald and harness mounting, Sectional Jacquard and harness arrangement - inverted hook jacquard. Principle of working comber board, Twilling Jacquard and Pressure Harness - String doup mounting for leno weaving

(10 Hours)

**References**

1. Grosicki Z.J, (1990) "Textile Design and Colour" - Butterworths London, 1990.
- 2 . Grosicki Z.J, (1990) "Advanced Textile Design & Colour" Butterworths, London,

**15RIMD4E10:ADVANCED FABRIC STRUCTURE AND DESIGN PRACTICAL**

(No. of Hours: 4      Credit:2      CFA:75; ESE:25)

**Objective:** To understand the principles and constructions of various furnishing fabrics like figuring with extra thread, Backed cloth, Pattern sateen, Damask, Double Cloth , Tapestry , Terry and Leno weaves.

**Learning outcome:**

Students of this course have been trained in preparing various home textile fabrics.

**PRACTICAL**

1. Preparation of suitable motif, graph enlargement, binding mark for extra warp and extra weft design - interchanging figured backed cloth, damask - interchanging figured double cloth with 2 colour and 4 colour combination - patent satin structure - warp rib brocade weft rib brocade - figured terry - figured velveteen - figured leno structure.
2. Practice in card cutting, lacing of the above design on pattern cards using hand punching and pedal punching machine. Mounting of these cards on jacquard loom.
3. Weaving practice of the above design on jacquard loom.
4. Practice on heuld and harness mounting for extra warp design.
5. Practice on sectional Jacquard and harness arrangement for producing double cloth.
6. Practice on working comb bound for producing pattern sateen construction.
7. Practice on pressure harness for making Damask fabric
8. Practice on string doup mounting & weaving leno fabric.
9. Design practice and card cutting of the above design on computer using computer aided textile design software.

**15RIMD4E11: ELECTIVE - II: KNITTING TECHNOLOGY-THEORY**

(No. of Hours: 3 Credit: 3 CFA:40; ESE:60)

**Objectives:** To know about the properties , construction of warp and weft knitted fabrics - knitting machineries and their production process - defects and calculation of Knit fabric production.

**Learning outcome:**

Students have been exposed and trained in operation of various knitting machineries and preparation of knitted fabrics.

**Unit I Properties of Woven and Knitted fabrics**

Terms and definitions used in Knitting, Yarn quality requirements for knitting. Comparison of warp and weft knitting. Classification of warp and weft knitting machines. Knitting needles: Spring - beard - Latch - Compound needles. (10 Hours)

**Unit II Introduction of Weft Knit structure**

Technical terms and symbolic representation of Weft Knit structure - Characteristics of Plain, Rib, Interlock, Purl Knit structures. Rib, interlock and purl circular knitting machines. Fundamentals of formation of knit, tuck and float stitches. Factors affecting the formation of loop. Effect of loop length and shape on fabric properties. Fault in knitted fabrics, causes and remedies. Production calculation. (10 Hours)

**Unit III Introduction of flat knitting machine**

Basic principles and elements of flat knitting machines. Different types of flat knitting machines-manual, mechanical and computer controlled knitting machines. Production of various fabric designs with flat knitting machines. Jacquard knitting - Pattern wheel, Pattern drum, Tape patterning devices, Electronic Devices. (10 Hours)

**Unit IV Introduction of Warp Knit Machine**

Warp knitting fundamentals, Basic Warp knitted structures, Closed lap and Open lap stitches. Classification of Warp Knitting Machines - Knitting elements of Raschel and Tricot knitting machine, Points of difference between Raschel and Tricot knitting machine. Representation of Warp - Knit structure. (10 Hours)

**Unit V Quality of Knit Fabrics**

Defects in weft and Warp Knitted fabrics, causes and remedies - Test for Weft Knit quality - Knitting Calculations for Weft Knits and Warp Knits. (8 Hours)

**References**

1. D.B.Ajgaonkar,., "Knitting Technology", Universal Publication Corporation, Mumbai, 1998.
2. D.J.Spencer., "Knitting Technology", Textile Institute, Manchester, 1989.
3. Chandrasekha Iyer, Bernd Mammal and Wolfgang Schach., "Circular Knitting", Meisenbach GmbH, Bamberg, 1995.
4. Samuel Raz., "Flat Knitting", The new generation", MeisenbachGmbH, Bamberg,
5. Samuel, Raz., "Warp Knitting Production", Mellian TextilberichteGmbH, Rohrbacher, 1987.



**15RIMD4E12:KNITTING TECHNOLOGY PRACTICALS**

(No. of Hours: 4    Credit:2    CFA:75; ESE:25)

**Objectives:** To know about the properties , constructions of warp and Knitting fabrics - knitting machineries and their production process - defects and calculation of Knit fabrics.

**Learning outcome:**

- Students have been exposed and trained in operations of various knitting machineries and preparation of knitted fabrics.

**PRACTICAL**

- To study the working Principle of Circular Weft Knitting machine
- To study the features of various types of Knitting needles
- Effect of Stitch length on Knitted fabric quality Setting of various machine parameters on Circular Knitting Machine

## 15RIMD4E13:ADVANCED TEXTILE WET PROCESSING-THEORY

(No. of Hours: 3 Credit: 3 CFA:40; ESE:60)

**Objectives:** To understand the mechanisms of various Textile Auxiliaries - Mercerisation Effect on Cotton - Dyeing of Various Textile Materials - Methods of Printing and Finishing Effect - Effluent Treatment - Energy conservation and Cost control.

**Learning outcome:**

- Students have been exposed and trained in application of various dyes and prints on textile fabrics.
- Understand effluent treatment, energy conservation and cost control of dyeing process.

**Unit I: Study of surface active agents**

Classification of surface active agents - its properties - various applications in wet processing - chemistry, mechanics and theories of wetting agent, detergents, levelling agents - Evaluation of detergency - Advances in surface active agents. (8 Hours)

**Unit II: Advancement in bleaching**

Advancement in bleaching - Chemistry, general properties, mechanism of optical brightening agent applicable to various fibres - Evaluation of bleaching, damages and defects caused by bleaching - Bleaching of man-made fibres, fabrics and their blends. History and development of mercerization - Physical and chemical aspects of mercerization - Factors determining the efficiency of mercerization - Mercerizing machinery - Advances in textile auxiliaries used in scouring, bleaching and mercerization. (10 Hours)

**Unit III: Advancement in Dyeing**

Chemistry, technology and mechanism of dyeing natural and man-made fibres and their blends - Physical chemistry of dyeing - Discontinuous, semi-continuous and continuous methods of application of dyes on natural fibres and study of the dyeing machinery involved - Faults in dyeing and their remedies - Computer colour matching - Evaluation of various fastness of dyed textiles - Identification of dyes - Natural Dyes- applications of testing. (10 Hours)

**Unit IV: Advancement in Printing**

Advances in thickeners and assistances used in textile printing and their functions - Printing procedures of different textiles and fabrics (including blends) with various classes of dyes and pigments - Machines used for printing, drying, ageing, steaming, etc. - Faults in printing and their remedies - Transfer and foam printing - Screen preparation - Computer aided print design. (10 Hours)

**Unit V: : Advancement in Finishing**

Chemistry and technology of finishing cotton, wool, silk, rayon and synthetic fabrics - Finishing chemical and auxiliaries - their functions and applications - Permanent and semi-permanent finishes of different textile, e.g., wash-n-wear, crease-resistant, anti-shrink, anti-static, water repellent finishes, mildew proofing, fire-proofing, calendaring, crabbing, milling, felting and stentering - Setting of synthetic fibres - Evaluation of finishing and their remedies - Damages/defects caused in finishing and their remedies - Effluent treatments - water recycling - energy conservation - cost control. (10 Hours)

**References**

1. M.Lewin, *Handbook of Fibre Science and Technology - Vol.2. Functional Finishes Parts A & B*, Marcel Dekkar Inc., New York.
2. R.H.Peters, *Textile Chemistry - Parts 1 & 2*, Elsevier Publishing Company, New York.
3. W Clerk, *Introduction to Textile Printing*, Newnes-Butterworths, London.
4. Dr.V.A. Shenai, *Textile Fibres*, Sevak Publications, Mumbai.
5. Dr.V.A. Shenai, *Technology of Bleaching and Mercerising*, Sevak Publications, Mumbai.
6. Dr.V.A. Shenai, *Technology of Dyeing*, Sevak Publications, Mumbai.
7. Dr.V.A. Shenai, *Technology of Printing*, Sevak Publications, Mumbai.
8. E.R. Trotman and Bl. Griffin, *Chemical Technology of Scouring and Bleaching*, B.I. Publications, New Delhi.
9. E.R. Trotman and B.I. Griffin, *Dyeing and Chemical Technology of Textile Fibres*, B.I. Publications, New Delhi.
10. R.S. Prayag, *Bleaching, Mercerising and Dyeing of Cotton Materials*, Mrs.L.R. Prayag, Dharwad.
11. Dr.V.A. Shenai and Dr.N.M. Saraf, *Dyeing of Silk*, Sevak Publications, Mumbai.
12. A.A. Vaidya and S.S. Trivedi, *Textile Auxiliaries and Finishing Chemicals*, ATIRA, Ahmedabad.
13. N.Manivasakam, *Treatment of Textile Effluents*, Sakthi Publications, Coimbatore-21.

**15RIMD4E14: ADVANCED TEXTILE WET PROCESSING - PRACTICAL**

(No. of Hours: 4    Credit:2    CFA:75; ESE:25)

**Objectives:** To understand the mechanisms of various Textile Auxiliaries - Mercerisation Effect on Cotton - Dyeing of Various Textile Materials - Methods of Printing and Finishing Effect - Effluent Treatment - Energy conservation and Cost control.

**Learning outcome:**

- Students have been exposed and trained in application of various dyes and prints on textile fabrics.
- Understand the effluent treatment, energy conservation and cost control of dyeing process.

**PRACTICAL**

1. Determination of strength of wetting agents and detergents
2. Bleaching of viscose rayon, polyester, acrylic, polyester/cotton blend and polyester/viscose rayon blend
3. Mercerising cotton fabrics
4. Determination of barium activity number of mercerized cotton yarn/fabric
5. Continuous method of dyeing wool
6. Discharge style of printing of silk and wool
7. Printing of polyester/cotton blend - direct style
8. Printing of polyester/cotton blend - discharge style
9. Printing of polyester/cotton blend - burnt out style
10. Softening finish and Wash-n-wear finish
11. Anti-static finish and Water repellent finish
12. Mildew proofing and Fire proofing

**15RIMD4E15: TECHNICAL TEXTILES - THEORY**

(No. of Hours: 3 Credit: 3 CFA:40; ESE:60)

**Objectives:** To understand the manufacturing process of Non- Woven fabrics - Various application of technical textile products on Geo, Medical and Industrial Textiles.

**Learning outcome:**

- Understand the manufacturing process of Non woven Materials.
- Understand the various applications of Technical Textiles products.
- Application of Non woven and woven products for functional application.

**Unit I Textiles and Fibres**

Technical Textiles - An Overview: Definition and scope of technical textiles, Milestones in the development of technical textiles, Textile processes, applications, Globalization of technical textiles, Future of the technical textiles industry. Technical Fibres: Introduction, High strength and high modulus organic fibres, High chemical- and combustion-resistant organic fibres, High performance inorganic fibres, Ultra-fine and novelty fibres, Fibres used in Civil and agricultural engineering, Automotive and aeronautics, Medical and hygiene applications, Protection and defence applications. (10 Hours)

**Unit II Applications**

Textile-reinforced Composite Materials: Composite materials, Textile reinforcement, Woven fabric-reinforced composites, Braided reinforcement, Knitted reinforcement, Stitched fabrics. Prepergs. Textiles in Filtration: Introduction, Dust collection, Fabric construction, Finishing treatments, Yarn types and fabric constructions, Fabric constructions and properties, Production equipment, Finishing treatments, Fabric test procedures. (10 Hours)

**Unit III Other Fields**

Textiles in Civil Engineering: Geosynthetics, Geotextiles, Essential properties of geotextiles, Engineering properties of geotextiles, Geotextile structure, Frictional resistance of geotextiles. Medical Textiles: Introduction, Fibres used, Non-implantable materials, Extra-corporeal devices, Implantable materials, Healthcare / hygiene products. (10 Hours)

**Unit IV Textiles In Defence**

Textiles in Defence: Introduction, Historical background, Criteria for modern military textile materials, Textiles for environmental protection, Thermal insulation materials, Water vapour permeable and waterproof materials, Military combat clothing systems, Camouflage concealment and deception, Flame-retardant, heat protective textiles, Ballistic protective materials, Biological and chemical warfare protection. (10 Hours)

**Unit V Textiles in Transportation**

Textiles in Transportation: Introduction, Textiles in road vehicles, Rail applications, Textiles in aircraft, Marine applications, Future prospects for transportation textiles. Belts, Tyre cords, Hoses: Introduction, Construction particulars, Fibres and yarns used.

(8 Hours)

**References**

1. A.R. Horrocks & S.C. Anand (Eds.), Handbook of Technical Textiles, The Textile Institute, Manchester, U.K., 2000, Woodhead Publishing Ltd., Cambridge, England.
2. S. Adanur "Wellington Sears Handbook of Industrial Textiles", Technomic Publishing Co. Inc., Lancaster, Pennsylvania, ISBN: 1-56676-340-1, 1995.
3. N.W.M. John, "Geotextiles", Blackie, London, ISBN: 0-216-91995-9, 1987.
4. S.K. Mukhopadhyay and J.F. Partridge, "Automotive Textiles", Text. Prog, Vol. 29, No.1/2, 1998, ISBN: 1870372212.
5. S. Anand, "Medical Textiles", Text. Inst., 1996, ISBN: 185573317X

**15RIMD4E16:ELECTIVE-II: TECHNICAL TEXTILES - PRACTICAL**

(No. of Hours: 4    Credit:2    CFA:75; ESE:25)

**Objectives:** To understand the manufacturing process of Non- Woven fabrics - Various application of technical textile products on Geo, Medical and Industrial Textiles.

**Learning outcome:**

- Understand the manufacturing process of Non woven Materials.
- Understand the various applications of Technical Textiles products.
- Application of Non woven and woven products for functional application.

**PRACTICAL**

Composites - Fabrication and Testing for Physical properties using different natural / synthetic/ high performance fibres - gums and resins applications

Hand Braiding - braided materials - multi layered fabrics- preparation and weaving using the tools in the lab.

Geo Textiles - simple coir / net/ structures

Thermal Insulation -Water proofing and heat protection coats / finishes on fabric and testing.

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**15RIMD0406: PROJECT WORK**

(No. of Hours: 4      Credit: 4      CFA:40; ESE:60)

Objectives: To orient the students in conducting and documenting project study

learning outcome:

Identify the problem for taking up project study  
Analysis the problem and draw inference  
prepare project report in a systematic manner.

Evaluation:

For evaluation of project report the following criteria will be adopted.

Internal valuation                      : 40 Marks

Joint Viva-voce Examination      : 60 Marks

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