REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (TT) SEMESTER-I

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
7.1	TT/MMTT	PROCESS MANAGEMENT IN YARN FORMING-I	3	---	---	3	100	50	---	---
7.2	TT	PROCESS MANAGEMENT IN FABRIC FORMING-I	3	---	---	3	100	50	---	---
7.3	TT	STRUCTURE & PROPERTIES OF FABRICS	3	---	---	3	100	25	---	50
7.4	TT/MMTT/TPE	TEXTILE MILL PLANNING & ORGANISATION	4	---	---	---	100	25	---	---
7.5	TT/MMTT/TPE/TC/FT	INDUSTRIAL ENGINEERING	3	---	---	---	100	---	---	---
7.6	TT	ELECTIVE-I	3	---	---	---	100	---	---	---
7.7	TT/MMTT/TPE/TC/FT	SEMINAR-I	2	---	---	---	---	50	---	---
7.8	TT/MMTT/TPE/TC/FT	INPLANT TRAINING-II	---	---	---	---	---	50	---	---
			21	**---**	**---**	**9**	**600**	**250**	**0**	**50**

L =LECTURES

T =TUTORIALS

DR=DRAWING

PR=PRACTICALS

TP=THEORY PAPER

TW=TERM WORK

OE=ORAL EXAMINATION

PE=PRACTICAL EXAMINATION

LIST OF ELECTIVE-I

1. SPECIALITY YARNS
2. GARMENT MANUFACTURING TECHNOLOGY
3. TEXTILE PRODUCT ENGINEERING
4. ECONOMICS

:ME
SUB.
TOTAL
150
150
175
125
100
100
50
50
900

REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (TT) SEMESTER-II

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
8.1	TT/MMTT	PROCESS MANAGEMENT IN YARN FORMING-II	3	---	---	3	100	50	---	50
8.2	TT	PROCESS MANAGEMENT IN FABRIC FORMING-II	3	---	---	3	100	50	---	50
8.3	TT/MMTT/TPE/TC	TEXTILE MILL MANAGEMENT	3	---	---	---	100	---	---	---
8.4	TT/MMTT	TECHNICAL TEXTILES	4	---	---	---	100	---	---	---
8.5	TT	ELECTIVE -II	3	---	---	---	100	---	---	---
8.6	TT/MMTT/TPE/TC/FT	SEMINAR - II	2	---	---	---	---	50	---	---
8.7	TT/MMTT/TPE/TC/FT	DISSERTATION	---	---	---	6	---	50	100	---
			18	**---**	**---**	**12**	**500**	**200**	**100**	**100**

L =LECTURES

T =TUTORIALS

DR=DRAWING

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TW=TERM WORK

OE=ORAL EXAMINATION

PE=PRACTICAL EXAMINATION

LIST OF ELECTIVE-II

1. FASHION TECHNOLOGY IN APPARELS & MADE-UPS
2. HOME TEXTILES
3. NON-WOVENS & GEO-TEXTILES
4. MAINTENANCE MANAGEMENT IN TEXTILE
5. ORGANIZATIONAL BEHAVIOUR AND HUMANITIES

:ME
SUB.
TOTAL
200
200
100
100
100
50
150
900

REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (MMTT) SEMESTER-I

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
7.1	TT/MMTT	PROCESS MANAGEMENT IN YARN FORMING-I	3	---	---	3	100	50	---	---
7.2	MMTT	MANMADE FABRIC MANUFACTURE-IV	3	---	---	3	100	50	---	---
7.3	MMTT	STRUCTURE & PROPERTIES OF MANMADE YARNS & FABRICS	3	---	---	3	100	25	---	50
7.4	TT/MMTT/TPE	TEXTILE MILL PLANNING & ORGANISATION	4	---	---	---	100	25	---	---
7.5	TT/MMTT/TPE/TC/FT	INDUSTRIAL ENGINEERING	3	---	---	---	100	---	---	---
7.6	MMTT	ELECTIVE -I	3	---	---	---	100	---	---	---
7.7	TT/MMTT/TPE/TC/FT	SEMINAR-I	2	---	---	---	---	50	---	---
7.8	TT/MMTT/TPE/TC/FT	INPLANT TRAINING-II	---	---	---	---	---	50	---	---
			21	**---**	**---**	**9**	**600**	**250**	**0**	**50**

L =LECTURES

T =TUTORIALS

DR=DRAWING

PR=PRACTICALS

TP=THEORY PAPER

TW=TERM WORK

OE=ORAL EXAMINATION

PE=PRACTICAL EXAMINATION

LIST OF ELECTIVE-I

1. FIBRE COMPOSITES
2. GARMENT MANUFACTURING TECHNOLOGY
3. TEXTILE PRODUCT ENGINEERING
4. ECONOMICS

:ME
SUB.
TOTAL
150
150
175
125
100
100
50
50
900

REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (MMTT) SEMESTER-II

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
8.1	TT/MMTT	PROCESS MANAGEMENT IN YARN FORMING-II	3	---	---	3	100	50	---	50
8.2	MMTT	PROCESS MANAGEMENT IN WEAVING	4	---	---	2	100	50	---	50
8.3	TT/MMTT/TPE/TC	TEXTILE MILL MANAGEMENT	3	---	---	---	100	---	---	---
8.4	TT/MMTT	TECHNICAL TEXTILES	4	---	---	---	100	---	---	---
8.5	MMTT	ELECTIVE -II	3	---	---	---	100	---	---	---
8.6	TT/MMTT/TPE/TC/FT	SEMINAR - II	2	---	---	---	---	50	---	---
8.7	TT/MMTT/TPE/TC/FT	DISSERTATION	---	---	---	6	---	50	100	---
			19	**---**	**---**	**11**	**500**	**200**	**100**	**100**

L =LECTURES

T =TUTORIALS

DR=DRAWING

PR=PRACTICALS

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OE=ORAL EXAMINATION

PE=PRACTICAL EXAMINATION

LIST OF ELECTIVE-II

1. FASHION TECHNOLOGY IN APPARELS & MADE-UPS
2. HOME TEXTILES
3. NON-WOVENS & GEO-TEXTILES
4. MAINTENANCE MANAGEMENT IN TEXTILE
5. ORGANIZATIONAL BEHAVIOUR AND HUMANITIES

:ME
SUB.
TOTAL
200
200
100
100
100
50
150
900

REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (TPE) SEMESTER-I

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
7.1	TPE	ENGINEERING DESIGN OF TEXTILE MACHINES-II	3	---	---	3	100	25	50	---
7.2	TPE	THEORY OF TEXTILE MACHINES-II	3	---	---	3	100	25	---	---
7.3	TPE	MAINTENANCE OF TEXTILE MACHINES	3	---	---	3	100	25	---	50
7.4	TT/MMTT/TPE	TEXTILE MILL PLANNING & ORGANISATION	4	---	---	---	100	25	---	---
7.5	TT/MMTT/TPE/TC/FT	INDUSTRIAL ENGINEERING	3	---	---	---	100	---	---	---
7.6	TPE	ELECTIVE -I	3	---	---	---	100	---	---	---
7.7	TT/MMTT/TPE/TC/FT	SEMINAR-I	2	---	---	---	---	50	---	---
7.8	TT/MMTT/TPE/TC/FT	INPLANT TRAINING-II	---	---	---	---	---	50	---	---
			21	**---**	**---**	**9**	**600**	**200**	**50**	**50**

L =LECTURES

T =TUTORIALS

DR=DRAWING

PR=PRACTICALS

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TW=TERM WORK

OE=ORAL EXAMINATION

PE=PRACTICAL EXAMINATION

LIST OF ELECTIVE-I

1. MECHATRONICS
2. CHEMICAL PROCESSING MACHINERY
3. GARMENT MANUFACTURING TECHNOLOGY
4. ENERGY CONSERVATION IN TEXTILES
5. PROCESS CONTROL IN SPINNING

:ME
SUB.
TOTAL
175
125
175
125
100
100
50
50
900

REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (TPE) SEMESTER-II

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
8.1	TPE	FLUID FLOW SYSTEMS & CONTROLS	3	---	---	3	100	50	---	50
8.2	TPE	INSTRUMENTATION & METROLOGY	3	---	---	3	100	50	---	50
8.3	TT/MMTT/TPE/TC	TEXTILE MILL MANAGEMENT	3	---	---	---	100	---	---	---
8.4	TPE	MAINTENANCE MANAGEMENT	4	---	---	---	100	---	---	---
8.5	TPE	ELECTIVE -II	3	---	---	---	100	---	---	---
8.6	TT/MMTT/TPE/TC/FT	SEMINAR - II	2	---	---	---	---	50	---	---
8.7	TT/MMTT/TPE/TC/FT	DISSERTATION	---	---	---	6	---	50	100	---
			18	**---**	**---**	**12**	**500**	**200**	**100**	**100**

L =LECTURES

T =TUTORIALS

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PE=PRACTICAL EXAMINATION

LIST OF ELECTIVE-II

1. CONDTION BASED MONITORING TECHNIQUES
2. PROCESS CONTROL IN WEAVING
3. FASHION TECHNOLOGY IN APPARELS & MADE-UPS
4. INDUSTRIAL TEXTILES
5. ORGANIZATIONAL BEHAVIOUR AND HUMANITIES

:ME
SUB.
TOTAL
200
200
100
100
100
50
150
900

REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (TC) SEMESTER-I

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
7.1	TC	TECHNOLOGY OF FINISHING - II	3	---	---	3	100	50	---	---
7.2	TC	APPAREL MANUFACTURING TECHNOLOGY	3	---	---	---	100	---	---	---
7.3	TC	TESTING & ANALYSIS OF TEXTILES	3	---	---	3	100	50	---	50
7.4	TC	THEORY OF DYEING & COLOUR MEASUREMENTS	4	---	---	3	100	50	**---**	---
7.5	TT/MMTT/TPE/TC/FT	INDUSTRIAL ENGINEERING	3	---	---	---	100	---	---	---
7.6	TC	ELECTIVE -I	3	---	---	---	100	---	---	---
7.7	TT/MMTT/TPE/TC/FT	SEMINAR-I	2	---	---	---	---	50	---	---
7.8	TT/MMTT/TPE/TC/FT	INPLANT TRAINING-II	---	---	---	---	---	50	---	---
			21	**---**	**---**	**9**	**600**	**250**	**0**	**50**

L =LECTURES

T =TUTORIALS

DR=DRAWING

PR=PRACTICALS

TP=THEORY PAPER

TW=TERM WORK

OE=ORAL EXAMINATION

PE=PRACTICAL EXAMINATION

LIST OF ELECTIVE-I

1. ADVANCED POLYMER CHEMISTRY
2. ADVANCED CHEMICAL PROCESSING
3. ENERGY MANAGEMENT IN CHEMICAL PROCESSING
4. ECONOMICS

:ME
SUB. TOTAL
150
100
200
150
100
100
50
50
900

REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (TC) SEMESTER-II

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
8.1	TC	GARMENT PROCESSING	3	---	---	3	100	50	---	50
8.2	TC	PROCESSING OF YARN & SPECIALITY FABRICS	4	---	---	3	100	50	---	50
8.3	TT/MMTT/TPE/TC	TEXTILE MILL MANAGEMENT	3	---	---	---	100	---	---	---
8.4	TC	MANUFACTURE OF TECHNICAL TEXTILES	3	---	---	---	100	---	---	---
8.5	TC	ELECTIVE -II	3	---	---	---	100	---	---	---
8.6	TT/MMTT/TPE/TC/FT	SEMINAR - II	2	---	---	---	---	50	---	---
8.7	TT/MMTT/TPE/TC/FT	DISSERTATION	---	---	---	6	---	50	100	---
			18	**---**	**---**	**12**	**500**	**200**	**100**	**100**

L =LECTURES

T =TUTORIALS

DR=DRAWING

PR=PRACTICALS

TP=THEORY PAPER

TW=TERM WORK

OE=ORAL EXAMINATION

PE=PRACTICAL EXAMINATION

LIST OF ELECTIVE-II

1. TEXTILE EFFLUENT TREATMENT
2. FASHION TECHNOLOGY IN APPARELS & MADE-UPS
3. **ORGANIZATIONAL BEHAVIOUR AND HUMANITIES**
4. MERCHANDISING

:ME
SUB. TOTAL
200
200
100
100
100
50
150
900

REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (FT) SEMESTER-I

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
7.1	**FT**	GARMENT PROJECT PLANNING & IMPLEMENTATION	4	---	---	---	100	50	---	---
7.2	FT	INDUSTRIAL ECONOMICS & COSTING OF APPAREL PRODUCTS	4	---	---	---	100	---	---	----
7.3	FT	ADVANCED GARMENT CONSTRUCTION	4	---	---	3	100	50	---	50
7.4	TT/MMTT/TPE/TC/FT	INDUSTRIAL ENGINEERING	3	---	---	---	100	----	---	---
7.5	FT	ELECTIVE-I	3	---	---	---	100	---	---	---
7.6	FT	PROCESS MANAGEMENT IN APPAREL & FASHION INDUSTRY	4	---	---	3	100	50	---	---
7.7	TT/MMTT/TPE/TC/FT	SEMINAR-I	2	---	---	---	---	50	---	---
7.8	TT/MMTT/TPE/TC/FT	INPLANT TRAINNING - II	---	---	---	---	---	50	---	---
			24	**---**	**---**	**6**	**600**	**250**	**---**	**50**

L =LECTURES
T =TUTORIALS
DR=DRAWING
PR=PRACTICALS

TP=THEORY PAPER
TW=TERM WORK
OE=ORAL EXAMINATION
PE=PRACTICAL EXAMINATION

LIST OF ELECTIVE-I

1. FASHION ACCESSORIES
2. INTELLECTUAL PROPERTY RIGHTS
3. HOME TEXTILES IN FASHION
4. TEXTILE PRODUCT ENGINEERING

:ME
SUB.
TOTAL
150
100
200
100
100
150
50
50
900

REVISED SYLLABUS W.E.F.01ST JULY, 2013

FINAL YEAR B.TEXT. (FT) SEMESTER-II

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHE			
			L	T	DR	PR	TP	TW	OE	PE
8.1	FT	CLOTHING CARE & SCIENCE	4	---	---	3	100	50	---	50
8.2	FT	IMPORT & EXPORT MANAGEMENT	4	---	---	---	100	50	---	--
8.3	FT	APPAREL & FASHION BUSINESS MANAGEMENT	4	---	---	---	100	---	---	---
8.4	FT	SMART TEXTILES & SPECIALITY GARMENTS	4	---	---	---	100	50	---	---
8.5	FT	ELECTIVE -II	3	---	---	---	100	---	---	---
8.6	TT/MMTT/TPE/TC/FT	SEMINAR - II	2	---	---	---	---	50	---	---
8.7	TT/MMTT/TPE/TC/FT	DISSERTATION	---	---	---	6	---	50	100	---
			21	**---**	**---**	**9**	**500**	**250**	**100**	**50**

L =LECTURES

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LIST OF ELECTIVE-II

1. FASHION PHOTOGRAPHY
2. CONSUMER BEHAVIOUR IN FASHION INDUSTRY
3. OPERATIONAL RESEARCH
4. CAPM FOR MEN'S & WOMEN'S WEAR

:ME
SUB.
TOTAL
200
150
100
150
100
50
150
900

FINAL YEAR B. TEXT - SEMESTER-I

7.1 PROCESS MANAGEMENT IN YARN FORMING-I (TT/MMTT)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Subject Total	:	150 Marks

I) **Introduction to process management –** Meaning of process management, functional and process management, various phases of process management like planning, organizing, linking of customer feedback and process management, cycle of process management.

II) **Raw material management –** Importance, need of instrumental evaluation, traditional methods of cotton selection, importance of cost in raw material, cotton marketing, use of linear programming for mixing, bale management yarn engineering & raw material, practical applications of AFIS & HVI.

III) **Yarn Realization –** Importance, estimation process, norms for various yarns like cotton, blended, analysis of yarn realization from mills.

IV) **Process management in blow room & card –** Blow room & card as integrated system, control of waste, cleaning efficiency, neps & fibre rupture, contamination control, selection of proper sequence process parameters, Influence of various factors in blow room & card.

V) **Process management in comber preparatory & combing –** Significance & importance of good lap for comber, evaluation of comber performance, fractionating efficiency of comber, comber waste analysis, influence of various factors on combing performance.

VI) **Process management in draw frame & speed frame –** Revision of basic principle of drafting, drafting wave & its significance, roller nip movement, roller speed variation, roller vibration, influence of parameters like speed, setting. Influence of process parameters like flyer speed, twist, break draft and settings, on roving quality, process control in speed frame. Importance and role of stretch control at speed frame.

VII) **Introduction to total quality management (TQM) –** Fundamental concepts of TQM, Basic approach, historical review, quality & business performance service quality versus product quality, obstacles.

VIII) **Organizing for TQM –** The system approach, organizing for quality implementation, switching over from traditional quality to total quality management, roles in transition, small group & employer involvement, team for TQM.

IX) **ISO 9000 & Total Quality –** Concept of ISO 9000 series, other quality systems, implementation, documentation, post certification, ISO / QS 9000 elements, internal auditing.

X) **Application of some modes of quality engineering –** Taguchi techniques, factional design, FMEA, TPM

List of Experiments

1. Testing of various cotton samples & their suitability for various counts.
2. Setting up of standards for given cotton to process upto draw frame for carded & combed counts.
3. To evaluate performance of a blow room for given cotton.
4. To evaluate performance of card for a given cotton.
5. To study effects of various parameters on transfer efficiency of card.
6. To study fibre orientation by No. of passages on draw frame with Lindsley technique.
7. Influence of step gauge setting on sliver quality.
8. To study effect of cylinder speed at comber.
9. To study stretch in roving & effect on U%, coil spacing.
10. To study break draft & its effect on roving quality.
11. To adjust wrapping & A% on RSB D30
12. Mill visit to study process management.

Reference Books

1. Quality Planning & Analysis – Product Development through use by Frank M. Gryna, McGraw Hill International.
2. Testing & Quality Management by Dr. V. K. Kothari, AFL Publication – Process in Textiles.

3. Textile Quality Physical method of Product & Process Control by Mairio Bona COMMETT program of EEC.
4. Process Control in Spinning by A. R. Khare & T. R. Subramaniam, ATIRA Publication.
5. Quality Control in Spinning – SITRA publication.
6. Principles of Roller Drafting by Foster, Manual of Textile Technology.
7. Monograph Series by BTRA.
8. Total Quality Management – A How to program for high performance business by John M. Kelly, Published by Aleycuder, Hamitton Institute Inc.
9. Textile Quality – Physical Methods of Product & Process Control by Mario Bona.
10. Total Quality Management by D. H. Bester Field et al Pearson Education, Inc.
11. ISO 9000 – Meeting the new international standards by Perry L. Johnson McGraw Hill Inc.

FINAL YEAR B. TEXT - SEMESTER-I

7.2 PROCESS MANAGEMENT IN FABRIC FORMING-I (TT)

Lecture	:	3 Hrs / Week
Practical	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Subject Total	:	150 Marks

I) **Introduction to Process Management:**

a) Object, scope and approach to achieve quality and productivity in fabric production,

b) Methodology adopted for the same (SQC, Direct Approach, and online monitoring)

II) **Quality and Production Management in Winding:**

a) Control of yarn joints quality on Automatic Winding machines for various materials – knots and splice (characteristics of good splice, appearance and strength ratings, splice testing, and adjustment of parameters), precautions in winding of Elastomeric, Dyed, Monofilament yarn etc

b) Yarn clearing: Yarn defects, Classimat classification, imperfections, condition of clearers and its maintenance, assessment of performance of winding machine (knot factor, clearing efficiency).

c) Unwinding and winding tension, relation with type of material and speed, use of (auto tense, auto speed)

d) Package quality: Causes and Remedies of package defects:

e) Method of assessing the productivity and adjustments in relation to material and count of yarn,

f) Material handling and work practices for optimum production and quality

g) Management information system applicable to winding.

III) **Process Management in Warping:**

a) Characteristics of perfect beam and monitoring the beam quality (flange condition, yarn continuity, beam density, yarn content, yarn tension, stop motion, drum, guides).

b) Machine parameters adjustment and machine condition maintenance for minimizing end breaks for various materials and counts.
c) Method of assessing productivity of warping machine & measures to improve the productivity.
d) Material handling and work practices to optimize production and quality.
e) Management information system.

IV) **Process Management in Sizing:**

a) Deciding the size recipe according to material and count of yarn, Preparation of quality size pastes w.r.t. concentration, viscosity and other properties.
b) Determination and achieving the correct size pick up by controlling various sizing conditions, Modern pick up control equipment.
c) Stretch and moisture level control on multicylinder sizing machine.
d) Characteristics of perfect sized beam and its achievement (sticky, cross, broken and missing ends, defective selvedge).
e) Method to increase weavability (wet splitting, after waxing, dry steaming etc.)
f) Minimizing the size losses at every stage.
g) Control of productivity.
h) Material handling and work practices to get optimum production and best-sized beams.
i) Management information system

V) **Process Management in Pirn Winding:**

a) Minimizing end break and stoppages due to mechanical failures.
b) Improvement of bobbin build.
c) Control of productivity.

VI) **Process Management in Drawing - in and warp tying.**

a) Evaluation of quality in drawing - in and warp tying.
b) Selection, storage use and reuse of healds, reeds and drop pins of Various types, (parameters of heald reed, drop-pins that affect weaving performance)
c) Precautions during drawing - in and warp tying process.
d) Productivity, norms and control.

VII) **Hard waste Reduction in Weaving Department:**

a) Approach to the reduction of hard-waste
b) Setting the standards of hard-waste
c) Ways to reduce hard-waste of different types in winding, warping, sizing, Pirn winding, drawing and loom shed.
d) Ways to reduce warp and weft related hard waste on shuttle less looms generated due to false selvedges.

VIII) **Reduction in Consumption of Accessories:**

a) Selection of accessories (Tests, quality)
b) Care of accessories (storage, dispensing)
c) Ways to reduce wear and tear and breakdown of costly spare

List of Experiments

1. Optimization of clearer and splicer parameters for different yarn counts and operate the winding machines to observe the results
2. To determine the end breakage rate of warping machine and calculate warping efficiency with the sett details in the visiting unit.
3. To determine size pick up by changing variables on the sample sizing machine to find effect on yarn properties
4. To prepare beam on the sample warping / sizing machine
5. To weave fabric of various weaves on sample weaving machine and observe its effect on the appearance on the fabric
6. Preparation of the jacquard design and to weave fault free fabric on loom with electronic jacquard
7. Setting of Rotary dobby
8. To determine the % loss of efficiency for probable reasons through snap study in the visiting weaving unit
9. Inspection of fabric defects and determination of the packing percent of the given Fabric length in the visiting unit
10. Fabric Analysis 2 samples
11. Fabric Analysis 2 samples
12. Fabric Analysis 2 samples

Reference Books

1. Process Control in Weaving by M.C. Paliwal & P.D. Kimothi
2. Weaving: Technology and Operations by Allan Ormerod.
3. Weaving Machine, Mechanisms, Management by Dr. Talukdar, Ajagaonkar, Sriramulu.
4. ATIRA, BTRA Publications for Norms on Winding, Warping, Drawing in Looms.
5. Machine Manuals of Various Shuttle less Looms and – Preparatory Machines.
6. Preventive Maintenance of Plain and Auto Loom – By BTRA.
7. Manual of shuttle less Weaving: PSG College Publication.
8. Shuttle less Weaving: NCUTE Publication.

FINAL YEAR B. TEXT - SEMESTER-I

7.3 STRUCTURE & PROPERTIES OF FABRICS (TT)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Practical Exam	:	50 Marks
Subject Total	:	175 Marks

I) Structure of Fabric

Classification & Structures of fabrics, geometrical properties of fabrics

II) Thermal Transmission Properties of Textile Structures

Nomenclature, Definitions of terms – thermal properties- thermal insulation, coldfeel, chillproofness, Factors affecting thermal properties, Methods of measuring thermal properties

III) Air – Permeability

Nomenclature, Measurement, Factors affecting Air Permeability of Fabrics, significance of air permeability of fabrics

IV) Moisture Transmission

Nomenclature, Moisture permeability properties of fabrics, factors affecting moisture transmission, Measurement.

V) Fabric Water Relations

Nomenclature, water proofing, water repellency, Mechanics of Wetting, developments in water proof & water repellent fabrics, Factors influencing water repellency & proofing, Methods of Measuring water repellency & proofing- wetting time test, water head test

VI) Crease Retention Wrinkle Resistance & Dimensional Stability

Nomenclature, Mechanics of Wrinkle Resistance, Inherent Wrinkle Resistance properties of fibres, effect of humidity and wetting on wrinkle resistance, chemical methods for improving wrinkle resistance and their effects, geometric factors

influencing wrinkle resistance, Methods of Measurement, dimensional stability and shape retention.

VII) Compressional Resilience of Fabrics

Nomenclature, compressional resilience properties of textile structures, factors contributing compressional resilience, Methods of measurement

VIII) Abrasion and Wear Resistance

Nomenclature, Mechanics of abrasion, factors influencing the abrasion resistance of a fabric, geometric aspects, abrasion aspects, method of measurement- universal wear tester

IX) Fabric Hand

Concept of fabric hand, objective and subjective fabric hand, objective evaluation by KAWABATA technique, FAST technique

X) Luster

Subjective aspects of luster, Physics of light reflection in luster, Measurement of Luster, effect of fabric construction on luster

XI) Fabric Bending

Cloth stiffness, relation between fiber and fabric stiffness, factors contributing fabric stiffness, measurement of bending parameters

List of Experiments

1. Estimation of Fabric Wear performance by using Universal Wear Tester.
2. Comparison of Crease Recovery of Grey & Resin Finished Cotton Fabric.
3. Analysis of plain, twill, sateen weave fabrics- Cover Factor & GSM.
4. Estimation of Thermal Insulation Behavior of different Weave/Cover/Fiber types of Fabric.
5. To estimate the Water proofing ability of fabric by water head tester
6. To assess the pilling performance of various fabrics
7. To determine the Stiffness & Drape of Woven & Knitted Fabrics.
8. To study the air permeability of a fabric for its suitability for various applications.
9. To Study the Bending behavior of different weaves by Cyclic Bending Test.
10. To determine the puncture resistance of Non-woven Fabric.

Reference Books

1. Structural Mechanics of fibres, yarns & fabrics by Herle, Grosberg and Backer.
2. Textile Yarn by Martindale and Goswami.
3. Properties of fibres, yarns & fabrics by Kaswel.
4. Physical Testing and quality control textile progress, Vol.23, No.1/2/3, by K. Slater.
5. Principle of Textile Testing by J.E. Booth.
6. Mario Bona – Textile Quality (Eurotex Series).
7. Cotton Testing by Steadman,
8. Physical Testing of Textiles by B.P. Saville
9. Textile Testing – Fibre Yarn & Fabric – by Dr. Arindam Basu (ATIRA)
10. Testing & Quality Management by Dr.V.K. Kothari (IIT-Delhi)

FINAL YEAR B. TEXT - SEMESTER-I

7.4 TEXTILE MILL PLANNING & ORGANISATION (TT/MMTT/TPE)

Lectures	:	4 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

I) **Project Planning** - Introduction, Capital investment required for project, Phases of Capital Budgeting, Difficulties in Capital expenditure, Phases involved.

II) **Formulation of a Project Report for Spinning, Weaving, Knitting Units** - Assumptions, Machinery Organizations, Requirement of Miscellaneous Fixed Assets & Machinery Stores & Spares, Requirement & Calculations related to Electrical Power, Lighting, Water, Steam, Compressed Air, etc.

III) **Techno-economic Viability** - Calculations of cost of project – Means of Finance – Estimates of sales & production – cost of production – working capital requirement – Profitability Projection – Break even point – Projected cash flow statements.

IV) **Site Selection** - Selection of site for textile mills, General location, Actual selection of specific site, Calculation of spatial requirements, factors influencing site selection, Climatic considerations, geo-technical report, bearing pressure etc. General information about textile manufacturing industry centers in India.

V) **Civil/Building Construction** - Consideration in building design, size, shape and configuration of building. Architectural & structural aspects of textile mill building. Building morphology, General principles of building construction & building functions, Types of factory buildings, Types of building construction. Material for construction with special reference to walls, roofs, floors, false ceilings, fire resistance, sound proof, etc. Colour schemes for buildings, interior & machinery in textile mills. Cost considerations in building construction, Orgonogram of building construction, Team, Tenders & Contracts.

VI) **Plant & Machinery Layout** - Significance of the concept, objectives and principles of layouts, kinds of layouts and their comparisons, flow pattern, work station design, tools and devices of making layouts, use of Auto-Cad for layouts, storage space requirements, plant layout procedure, factors influencing layouts, selection of layout, effect of automation on plant layout, symptoms of

bad layout. Layout aspects of spinning, weaving, knitting and composite mills. Spatial requirements of spinning / weaving / knitting machines.

VII) **Machinery Specification, Selection & Calculation for No. of Machines** - Selection of machines & machinery specifications required for the product in spinning, weaving, knitting etc.

Calculation for number of machines in spinning /spin plan - Preparation of organization for ring spinning mill and preparatory, departments based on ring spindle capacity and production of ring spun yarn. (Carded, Combed, Blended, Folded) Preparing organization of rotor spinning mill. Calculation regarding efficiency, waste, draft, twist, production rates, amount of raw material required and number of machinery required at different stages of processing.

Calculation for number of machines in weaving / weave plan - Preparation of organization for shuttle & shuttleless weaving mill and preparatory departments based on number of weaving machines & production of different cloths. Calculation regarding efficiency, waste, crimp, production rates, raw material and number of machinery required at different processes.

VIII) **Materials Handling** - Definition and importance of materials handling, functions and principles of materials handling, material handling methods, engineering and economic factors, relationship to plant layout, selection and type of material handling equipments, study of different types of equipments used for materials handling in spinning, weaving, knitting mills.

IX) **Labour Compliments** - Types of labour required, labour compliment, labour and staff required for spinning and weaving based on workload consideration. Use of mathematics for number of operations in deciding the workload.

Reference Books

1. Textile Project Management by A. Ormerod, The Textile Institute Publication.
2. Goal Directed Project Management by E.S. Andersen, K.V. Grude & Tor Hang, Coopers & Cybranl Publication.
3. Project, Planning Analysis, Selection Implementation & Review by Prasanna Chandra, Tata McGraw Hill Publishing Co. Ltd.,
4. Management of Textile Production, A. Ormorod. Newnes – Butter Wortrs Publication.

5. Plant location, Layout & Maintenance by Ruddele Reed.
6. Industrial Organisation & Engg. Economics T.R. Banga & S.C. Sharma, Khanna Publishers, Delhi.
7. Norms for Process Parameters, Productivity etc. ATIRA, BTRA, SITRA, NITRA, etc.
8. Trade Literature of Different Machinery Manufacturers.
9. A Weavers' View Can We Afford Not to invest by L. Cegielka M.A, The Textile Institute Publisher.
10. Management of Textile Industry – Dr. V. Dudeja

FINAL YEAR B. TEXT - SEMESTER-I

7.5 INDUSTRIAL ENGINEERING (TT/MMTT/TPE/TC/FT)

Lectures : 3 Hrs / Week

Theory Paper: 100 Marks

Subject Total : 100 Marks

I) Introduction –

Concept of Industrial Engineering, definition, history & development, various techniques of Industrial Engineering, Scope in Textiles

II) Production Planning & Control (PPC) –

a) Production – Definition, Types of production, characteristics of each type production.

b) Productivity – Definition, ways to increase productivity, measurement of productivity – Total productivity Index & factor productivity indices.

c) Definition of PPC, Functions of PPC

d) Sales forecasting, various techniques of sales forecasting, problems.

e) Gantt chart, types, use.

III) Plant layout

Objectives of good plant layout, types of layout

IV) Work Study –

Definition, techniques, objectives, use of work study to increase productivity

a) Method Study – Definition, steps in method study, details of every step, charts used for recording, outline chart, flow process chart & its types, two handed process chart, multiple activity chart, principles of motion economy.

b) Micromtion Study – Contribution of Gilbreth, Therbligs, Prodedure, SIMO Chart.

c) Work Measurement – Definition, Techniques, concept of total time, standard time, allowances, problems

V) Operation Research –

Definition, various techniques of OR.

a) Basics of linear programming – Formulation of LP, Graphical solution, simplex method, problems

b) Network Analysis – PERT, CPM, and comparison.

VI) Value Engineering –

Value, concept of value analysis, concept of value engineering, Reasons of unnecessary cost, value analysis procedure.

VII) a) Job Evaluation-

Definition, objectives, procedure of job evaluation, methods of job evaluation

b) Merit Rating-

Introduction, objectives, methods of merit rating

VIII) Inventory Control –

Concept, Types, ABC Analysis, EOQ, EBQ

Reference Books

1. Work Study – ILO
2. Work Study in Textiles – ILO
3. Elements of Production Planning & Control – Samual Eilon.
4. Industrial Engineering & Management – Banga Sharma.
5. Industrial Engineering & Management – O. P. Khanna.
6. Industrial Engineering Manual of Textile Industry – Nobert Lioyd Enrick.
7. Industrial & production engineering – Sanjay S. Patil, & Nandkumar Hukeri.

FINAL YEAR B. TEXT - SEMESTER-I

7.6 SPECIALITY YARNS (TT) (ELECTIVE-I)

Lectures : 3 Hrs / Week

Theory Paper: 100 Marks

Subject Total : 100 Marks

1. **Core and cover yarns: -** Principles of formation of yarn, constructional details of machine, process description, production of different types of core and cover yarns, yarn properties & end uses.
2. **Melange Yarn: -** Concepts of producing mélange yarn. Process and sequence used for production of Melange yarn.
3. **Special Yarns on Unconventional Spinning Technologies: -** Manufacture Properties & end uses of, Siro, Bobtex, Self-twist, Twistless, etc. Concepts of composite yarns
4. **Metalized Yarns: -** Concepts of Metallic and Metalized yarns, Characteristics of metalized yarn – Manufacture of metalized yarns , Applications of yarns.
5. **Sewing Threads: -** Introduction to thread construction, Characteristics of sewing threads, production methods, Types of thread packages,
6. **Ropes, Cordage, & Twines: -** Requirements of initial fibres & yarns, Manufacturing process, structures & properties of yarns.
7. **Embroidery Yarns, Laces & Braids: -** Introduction, Process sequence, Manufacturing details & Machines required. Properties & application of embroidery yarns, Laces & Braids.
8. **Neppy and fleck yarn: -** Production, properties of yarn & applications.
9. **Manufacture of some special purpose yarns like:–** Slub, double twist, Knop yarn, Chenille yarn, Diamond yarn, Eccentric yarn, Boucle yarn, Thick 'n' Thin Yarns.

Reference Books

1. ‘Sewing Threads’ Textile progress vol.30 no.3/4, by J.O. Ukponmwan, The Textile Inst. Publisher.
2. ‘Modern Yarns for Modern Fabrics Seminar’ Conference proceddings. By TTI, The Textile Inst. Publisher. 25

3. Woollen – Yarn manufacture' Textile progress, vol.15, no.1/2 by D.A. ROSS, The Textile Inst. Publisher.
4. 'The production of textured yarn by methods other than the false – twist technique, The Textile progress vol.16, No.3, By D.K. Wilson and T Kollu, The textile Inst. Publisher.
5. Yarns & Fabric Classification Main Items in wool and blends, Italtex Editor.
6. Fancy yarns: Their manufacture and application R H Gong and R M Wright, UMIST, UK, The Textile Inst. Publisher.
7. The Textile Institute Publication - Manual of Textile Technology – Short Staple Spinning Series Vol.V – New Spinning System by W. Klein.
8. Fundamentals of staple yarn manufacture: Lawrence Carl.
9. "Different technologies to spin compact yarns" by V K Kothari, The Indian T

FINAL YEAR B. TEXT - SEMESTER-I

7.6 GARMENT MANUFACTURING TECHNOLOGY (TT/MMTT/TPE)

(ELECTIVE-I)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

I) **The Garment Industry**: Structure of the garment Industry, sectors of Industry, product types and organization. Apparel industry in India, Domestic industry, size of the industry, nature of the industry, its developments in recent years. Export industry: Size and nature of the industry.

II) **Basic Pattern Making:** Measurement Taking – Size chart and Measuring of Sizes. Definition of various garments parts & positions. Methods: Bespoke method & Industrial method (Using Blocks) – Basic block construction – Block preparation & correction. Figure analysis: Body ideals, body proportion, height, weight distribution, body parts, individual figure analysis, study of body measurement of all age groups. Muslin pattern, commercial pattern, sizes and its understanding, fabric preparation for garment construction.

III) **Manufacturing Technology**:

- Types of Fabric Packages – Types of Fabrics – One Way – Two Way Fabrics –Their effect on spreading –Methods of Fabric spreading – Spreading equipments – Computerized spreaders – Marker making –Marker efficiency – Factors affecting marker efficiency – Marker duplicating methods – Computer aided marker making.
- Introduction to cutting machines – Types and functions of cutting machines – straight knife, round knife, band knife, cutting machines – Notches, drills, die cutting machines – Computerized cutting machines –maintenance of cutting machines – common defects in cutting & their remedies.
- Types of needles – Parts of needles and their function – Needle size - sewing thread – properties of sewing threads – ticket number – fabric sewability. Seam quality – effect of stitch type on seam quality. Selection of seam and stitch.

- ❖ Federal classification of seam and stitches – Basic parts of sewing machine – Needle – Bobbin case /Bobbin hook, Loopers – Loop spreader – Threading fingers – Throat plate – Tongue chaining plates – Takeup devices – Tensioners – Feed dog – Pressure foot for sewing.
- ❖ Sewing Technology : feed systems, , machinery and equipment, basic sewing machines, like general sewing, over locking, safety stitching, blind stitching, button holes, bartacking, & button sewing, special sewing machines like three thread overlock with a microprocessor, Sewing problems, slipped stitches, stay gered stitches, unsalaneed stitching pocker etc.

a) **Fusing Technology:** Construction of Fusibles, Fusing process, Fusing machinery, quality control.

b) Study of various components such as buttons, zips, underlining, Hooks and ornamental materials, - fly, kissing, lap; Button and buttonholes, hooks and eye snaps, Velcro and other accessories.

c) **Pressing Technology:** Classification, components of Pressing, machinery and equipments viz. Hand irons, dry iron, electric steam iron, under pressing, top pressing, scissors press,Carousel machines, Steam dolly, tunnel finishing, controls, handling systems, boiler room.

d) **Garment Finishing and Inspection:** Attaching buttons, marking, sewing labels, cleaning, final touch, fitting quality, live models, measurements, viewing the garments, quality standards.

IV) **Production Technology**: Manual systems, making through, section system, progressive bundle system, straight line system, mechanical transport systems, selective conveyor belt system, unit production system, quick response sewing system.

- ❖ Ware Housing: Handling equipment, storage equipment, packing equipment.
- ❖ CAD/CAM in Garment Manufacturing.

Reference Books

1) Introduction to clothing Manufacture by Gerry Cooklin
2) Technology of clothing manufacture by Harrold carr & Barbara Lathem
3) Apparel Manufacturing Handbook by Jacob Solinger.,
4) Clothing construction and wardrobe planning by Dora S. Lewin, Mabel Goode Bowers, Manetta Knttunen — The Macmillan co New York
5) Garment Technology by Dr. V.Subramaniam — Winter School booklets 1990

6) BIS publications 1989.

FINAL YEAR B. TEXT - SEMESTER-I

7.6 TEXTILE PRODUCT ENGINEERING (TT/MMTT/FT) (ELECTIVE-I)

Lectures : 3 Hrs / Week
Theory Paper: 100 Marks
Subject Total : 100 Marks

1. Product Engineering – Objectives and Scope of product development in textiles and clothing. performance and serviceability concepts in textiles. Effect of changes in fibre, yarn type and fabric construction and finishing on performance and serviceability of textile products. Consideration of a good product design. Product development procedure -Selection of product, Product analysis, Product design procedure- Preliminary design, Maintainability, Reliability and Redundancy, Final design. Product life cycle.
2. Market Research, Material Research, Equipment and process research,
3. Product Appraisal – Functional, aesthetic, Manufacturing and economical analysis.
4. Simulation of specified properties or structures leading to design – Special yarns, Woven fabrics, Non – woven fabrics, Simulation of material, Texture by using computer graphics, Concept of overall designing procedure.
5. Case studies related to product development of textiles.

Reference Books

1. Hand book of Textile Design Principles, Process and Practice by Jacquie Wilson, Textile Institute Publication.
2. The Design Logic of Textile Products, Textile progress vol. 27, No. 3, T Matuo and M. N. Suresh. The Textile Institute Publication.
3. Engineering Design by George Dieter.
4. Total Quality Management by Dale H. Besterfield.
5. Proceedings of the Seminar – Non woven Technology, Market and Product Potential, IIT, New Delhi, December 2006.

FINAL YEAR B. TEXT - SEMESTER-I

7.6 ECONOMICS (TT/MMTT/TC) (ELECTIVE-I)

Lectures : 3 Hrs / Week

Theory Paper: 100 Marks

Subject Total : 100 Marks

I) Definition of Economics – Nature and Scope of Economics

II) Demand Analysis – Demand and law of demand – Elasticity of demand. Supply and Law of Supply - Consumer's surplus

III) Scale of Production – Laws of returns to scale – Costs and cost curves – Equilibrium of the firm and industry.

IV) Markets and Forms of market - Features of Perfect and Imperfect Competition. Price Determination under perfect competition – market price and normal price – price determination under imperfect competition.

V) National Income – Concept and importance – Nature and functions of money.

VI) Credit and Credit Instruments - Banking – Central Banking.

VII) International Trade - Balance of Trade and Payments – Foreign exchange rate.

Reference Books

1. Elementary Economics Theory by K. K. Dewett and J. D. Varma
2. Basic Economics by James A. Dgal, Nicholas Karatjas
3. Applied Economics by Derek T. Lobley.
4. Micro Economic Theory by M. C. Vaish.
5. Principles of Economics by D. N. Dwived.
6. Economics Analysis, Decision Making & Policy by George Leland Bach.
7. Contemporary Economics by Milton H.
8. Engineering Management by Frgidon Mazda – Addison Weley Longman Pearson Education.
9. Economics Environment of Business by V. K. Garg Sultan Chand & Sons Educational Publishers.
10. Management for Business and Industry by Cloute S. George.
11. Essentials of Management by Koontz Odonell.

FINAL YEAR B. TEXT - SEMESTER-I

7.7 SEMINAR-I (TT/MMTT/TPE/TC/FT)

Lectures : 2 Hrs / Week

Term Work : 50 Marks

Subject Total : 50 Marks

Topic -

In the beginning of the semester, every student of the class will be assigned a seminar topic in the emerging / perspective field in the area of textiles such as Spinning, Weaving, Fibres, Testing, Chemical processing and alike. Seminar should be based on the literature survey on any topic of textiles.

Seminar Preparation and Presentation –

Student will collect the information on the above subjects and submit the report on the dates specified by the concerned faculty. The seminar report will be of minimum 15 pages and maximum 25 pages. The spacing between the lines will be 1.5. The font size will be 13.5 point Times New Roman. The list of reference must be given at the end of seminar report. The list of reference should be written as per the Textile Research Journal format. The student has to present seminar in front of the faculty member of the department and his/her classmates. The faculty member, based on the quality of the work and preparation and understanding of the candidate, shall do an assessment of the seminar internally.

Term Work Marks –

Seminar Report - 20 Marks

Presentation - 30 Marks

FINAL YEAR B. TEXT - SEMESTER-I

7.8 INPLANT TRAINING-II (TT/MMTT/TPE/TC/FT)

Duration : 04 Weeks

Term Work : 50 Marks

Objective:

1. To orient the student with the environment of the industry and work culture.
2. To make them familiar with the current industrial process and practices.
3. Study of machines and processes, which cannot be demonstrated in the Institute.
4. To provide opportunities to the student to solve the industrial problems.
5. To develop right type of attitudes.
6. Develop deep understanding of techniques like production planning, Quality Control, Maintenance System, Environment and Pollution Control, Management Information System, Organization Structure, Design of Product, Material Testing, etc.
7. Gain, hands-on experience in handling machines and instruments.
8. Understand the roles of various levels of staff.
9. Maintain daily diary regularly in systematic manner.

Training Period:

Four Weeks during summer vacation after completion of second semester of Third Year B. Text.

Industry:

Spinning, Weaving, Garment, Processing, Synthetics, Textile Chemicals & Auxiliaries, R&D, Machinery Manufacturing, Marketing, Technical Textiles (any one), etc.,

Observations:

Observe working of industry and collect data as per guidelines given in Daily Diary.

Training Report:

After completion of training report should be prepared as per following guidelines.

* Report should have Title on Cover of Report as per Format.
* Report should be prepared as per following sequence -

I Page Certificate from Institute as per Format.
II Page Acknowledgement
III Page Programme of Training
IV Page Introduction of Industry
V Page Index with Page Numbers
VI Page Plant/Dept. Layout
VII Page Organization Structure.
VIII Page (Onwards) Department wise / Product wise Report: Report should be based on Own Observations made, data colleted during Inplant Training (i.e. Study of Machinery, Actual Production and Efficiency, Production Control, Modern Developments in Machines/Process, Flow Chart of Processes, Speed of Important Parts, Labour Allocation, Maintenance Practices, Process Control & Quality Control Activities etc.) roles and responsibilities of various Workers/Technical Staffs.

Special Study: Mini Project Undertaken, Costing, Production Planning & Control, Target Achievement, Information regarding humidification plant, Utility, Electrical Supply, Store, Purchase, Marketing, Sales, Samples, Lay-out of Mill etc.

Assessment:

Viva-voce to be conducted in first semester of Final Year B.Text. Term Work Marks are assigned on the basis of student's performance in viva-voce, conducted by internal / external examiners having industrial experience.

FINAL YEAR B. TEXT - SEMESTER- I

7.2 MANMADE FABRIC MANUFACTURE - IV (MMTT)

Lectures	:	3 hrs/week.
Practicals	:	3 hrs/week.
Theory Paper	:	100 marks.
Term Work	:	50 marks
Subject Total	:	150 marks

CHAPTER 1: WEFT KNITTING

Introduction:

Types of knitted fabrics, their applications, properties and basic structure of warp and weft knitting. Terms and definitions used in knitting. Comparison of knitting with woven fabric with respect to production and properties. Concept of hand knitting. Evolution of knitting from hand to machine knitting. Concept of flat and circular knitting.

Circular Weft Knitting:

a. Knitting cycle and basic elements of knitting. Essential elements of knitting machine – yarn supply arrangement, loop forming arrangement and fabric take down mechanism.
b. Passage of yarn through circular weft knitting machine. Study of elements of knitting machines such as :

1. Creel – Construction, types, capacity and their suitability.
2. Yarn feeding – Need, construction, drive, types of positive and negative feeders, stop motions, indicators, tensioners etc.
3. Loop forming mechanism – Knitting cycle, types of needles and their comparison. Study of essential elements of loop forming such as cylinder, sinker, cam, dial, yarn guide.
4. Take down motion – Spreader, Nip roller, cloth roller, Drive mechanism and its types, cloth roller capacity. Machine and material monitoring systems.

Weft Knit Structures:

a. Principle stitches such as Knit, Tuck, Miss and their representation and their effect on fabric properties.
b. Types and properties of knitted fabrics such as single jersey, double jersey (Interlock, Rib and Purl). Manufacturing process of these fabrics. Conditions for the use of delayed and synchronized timings.
c. Fabric analysis method, representation of design, Needle order, Cam order. Basic designs and the derivatives (1. Single Jersey – cross - miss, lapique, longitudinal tuck stripes, plain pique. 2. Rib – milano, half milano, cardian, half cardian, double cardian, Swiss and French double pique. 3. Interlock- Interlock Pique, Texi pique, Pintuck, Interlock super roma, Bourrelet).
d. Concept of colour Jacquards.

Advanced Knitting Process:

a. Relative Technology (Relanit) on circular knitting machines.
b. Concept of mechanical and electronic jacquard.
c. Structure and knitting of fleecy and plush fabrics
d. Concept and mechanism of striper and loop transfer

Weft Knitted Fabric Quality and Calculations:

a. Weft knitted fabric defects and their remedies. Yarn quality requirements
b. Circular weft knitting machine production calculations, fabric weight and Tightness factor. Knitted fabric relaxation concept.
c. Relation between machine gauge and yarn count.

CHAPTER 2: FLAT KNITTING

a. Basic elements and their functions of flat knitting machine. Hand and machine operated flat knitting machines and their knitting actions.
b. Machine operation for various stitches such as Miss, Tuck, Transfer, and Drop Stitch.
c. Design with and without needle selection, bed racking, new formed and transfer loop for hand and power operated machines. Concept of seamless knitting.

CHAPTER 3: WARP KNITTING

Introduction:

Structure, properties and applications of warp knitting. Knitting cycle and basic elements of warp knitting, Essential elements of warp knitting machine like: yarn supply, loop forming and fabric take down mechanism, warp preparation for warp knitting.

Warp Knitting Machine:

a. Passage of yarn through warp knitting machine.
b. Essential elements of warp knitting machine such as yarn supply arrangement, loop forming mechanism and fabric take down mechanism.
c. Knitting cycle of Tricot and Raschel warp knitting machine.

Warp Knitted Fabric Structure:

a. Study and representation of single, two guide-bar and multi guide-bar (Tricot, Raschel) structures.
b. Weft insertion techniques, Terry technique, Sinker pile fabrics, fall plate, cut press techniques.
c. Net fabric manufacturing

Warp Knitted Fabric Quality and Calculations:

a. Warp knitted fabric defects and their remedies. Yarn quality requirements
b. Production calculation on weight and length basis
c. Fabric weight calculation
d. Concept of rack, run-in
e. Relation between machine gauge and yarn count.

CHAPTER 4: SOCKS AND GLOVES KNITTING

Basic machines for above items, working principles and types

List of Experiments:-

1. Study of single jersey circular weft knitting machine – yarn supply arrangements, loop forming mechanism, takedown motion, Production calculation.
2. Study of double jersey circular weft knitting machine – yarn supply arrangements, loop forming mechanism, takedown motion, Production calculation.
3. Study of warp knitting machine – yarn supply arrangements, loop forming mechanism, takedown motion, Production calculation.
4. Study of flat knitting machine – yarn supply arrangements, loop forming mechanism, takedown motion, Production calculation.
5. Design setting on single jersey circular weft knitting machine- Machine operation, cam and needle arrangements, yarn feeding and take down setting.
6. Design setting on Double jersey circular weft knitting machine- Machine operation, cam and needle arrangements, yarn feeding and take down setting.
7. Design setting on warp knitting machine- Machine operation, pattern chain and guide arrangements, yarn feeding and take down setting.
8. Knitted fabric analysis.
9. Knitted fabric analysis.
10. Visit to knitting unit.

Reference Books

1. Knitting Technology by Prof. D. B. Ajgaonkar.
2. Circular Knitting by Dr. Chandrashekhar Iyer.
3. Knitting Technology by Mr. D. Spenser.
4. Warp Knitting by Dr. S. Raz.
5. Flat Knitting by Dr. S. Raz.

FINAL YEAR B. TEXT - SEMESTER-I

7.3 STRUCTURE & PROPERTIES OF MANMADE YARNS & FABRICS (MMTT)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Practical Exam	:	50 Marks
Subject Total	:	175 Marks

I) Classification and Structure of yarn

Classification of yarns, Yarn structures – fundamental structural features of yarns. Structurally related performance of yarn, effect of mechanical & chemical treatment

II) Twist in Yarns

Geometry of twisted yarns, idealized helical geometry, twist contraction, twist and packing of fibers in yarns, idealized packing and packing in actual yarn, concentrating and deviating features of actual yarn, specific volume and packing fraction, derivation of K(Schwarz constant)

III) Form and fiber arrangement in twisted yarns

Fiber migration – Ideal migration, Characterization of migration behavior, Factors affecting migration of man-made fibers in the yarn, tension variation as a mechanism of migration, frequency and order of migration.

IV) Theory of the extension of continuous filament yarns

Simplest analysis of tensile behavior, analysis with transverse forces & lateral contraction, analysis for large extension, prediction of breakage, prediction of load - extension curve, energy method, Observed extension & breakage of continuous filament yarn,

V) Mechanical Properties of Yarns

Mechanics of yarn structures, tensile behavior of continuous filament yarns. Influence of processing factors on tensile properties of yarns. Observed extension & breakage of spun yarns, experimental studies

VI) Thermal properties of Fabrics

Nomenclature, Definitions of terms – thermal properties- thermal insulation, coldfeel, chillproofness, Factors affecting thermal properties, Methods of measuring thermal properties

VII) Moisture Transmission of fabrics

Nomenclature, Moisture permeability properties of fabrics, factors affecting moisture transmission, Measurement.

VIII) Crease Retention, Wrinkle Resistance & Dimensional Stability

Nomenclature, mechanics of wrinkle resistance, factors influencing the wrinkle resistance, dimensional stability & shape retention.

IX) Serviceability, Wear & Abrasion

Nomenclature, serviceability, wear & abrasion, Mechanics of abrasion, Influence of fabric/yarn/fiber structural parameters on abrasion resistance of fabric

X) Fabric Hand

Objective & subjective evaluation of fabric hand, Hand Nomenclature, Factors influencing fabric hand, Measurement of fabric hand by Kawabata & FAST techniques

List of Experiments

1. Dry & Wet tenacity of cotton / blends.
2. Measurement of Filament Friction by Zweigle Friction Tester..
3. Estimation of Fabric Wear performance by using Universal Wear Tester.
4. To estimate Crease recovery of Heat Set & Non- Heat Set Polyester Fabrics
5. To compare Thermal Insulation Behaviour of Staple Yarn & Filament Yarn, Woven Fabric.
6. To estimate the Filament Diameter by using microscope
7. To estimate the Water proofing ability of fabric by water head tester.
8. To Study the Bending behaviour for Filament & staple Yarn Fabric by Cyclic Bending Tester.
9. To determine Air permeability of different Fabrics.
10. To determine the puncture resistance of Non-woven Fabric.

Reference Books

1. Structural Mechanics of fibres, yarns & fabrics by Herle, Grosberg and Backer.
2. Textile Yarn by Martindale and Goswami.
3. Properties of fibres, yarns & fabrics by Kaswel.
4. Physical Testing and quality control textile progress, Vol.23, No.1/2/3, by K. Slater.
5. Principle of Textile Testing by J.E. Booth.
6. Mario Bona – Textile Quality (Eurotex Series).
7. Cotton Testing by Steadman,
8. Physical Testing of Textiles by B.P. Saville
9. Textile Testing – Fibre Yarn & Fabric – by Dr. Arindam Basu (ATIRA)
10. Testing & Quality Management by Dr.V.K. Kothari (IIT-Delhi)

FINAL YEAR B. TEXT - SEMESTER-I

7.6 FIBRE COMPOSITES (MMTT) (ELECTIVE-I)

Lectures : 3 Hrs / Week
Theory Paper : 100 Marks
Subject Total : 100 Marks

1. **Introduction** – Definition, General Characteristic, Applications of composites.
2. **Materials** – Fibres, Matrix, Thermoset matrix, thermoplastic matrix, fibre surface treatment, fillers and other additives, incorporation of fibres into matrix, fibre content, density & void content
3. **Mechanics** – Fibre - matrix interactions in a unidirectional lamina, characteristics of fibre reinforced lamina, laminated structure, Inter matrix stresses.
4. **Performance** – Static, mechanical properties fatigue properties, impact properties, other properties, environmental effects, long term properties, fracture behavior & damage tolerance.
5. **Manufacturing** – Fundamental, Bag moulding process, compression molding, pultrusion, filament winding, other manufacturing process, Manufacturing process for thermoplastic composites, quality inspection methods.
6. **Design** – failure predictions, laminate design considerations, joint design, design examples, application examples.
7. **Metal and ceramic Matrix composites** – Metal Matrix composites, ceramic Matrix composites,
8. Analysis and modelling of three dimensional textile structural composites.

Reference Books

1. Fibre reinforced composites – Materials Manufacturing and design – P. K. Mallick
2. High tech fibrous materials composites bio medical materials, Protective clothing & geo textiles – Vigo & Turbak
3. Carbon fibres in composites materials – R. M. Gill.

FINAL YEAR B. TEXT - SEMESTER-I

7.1 ENGINEERING DESIGN OF TEXTILE MACHINES-II (TPE)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Oral Exam	:	50 Marks
Subject Total	:	175 Marks

1. **Design for fatigue strength** – Stress concentration, fluctuating stresses, fatigue failure, endurance limit, Notch sensitivity, Reversed stresses, Design for finite and infinite life, Cumulative damage in fatigue, Soderberg & Goodman diagrams, Modified Goodman diagrams.
2. **Design of sliding & Antifriction Bearing** – Hydrodynamic and Hydrostatic lubrication, Viscosity, Hydrostatic step bearing & its energy losses. Reynold's equation & Sommerfeld no. for one dimensional flow, temperature rise, bearing design – selection of parameters, constructional details & materials etc.
3. Cost consideration in design, Ergonomics, standardization.
4. **Design consideration of machine frames** – Design consideration of machine frames, bed, covers and bodies, design consideration for casting, forging & fabricated parts.
5. **Design of pressure vessel** – Classification, design of thick & thin cylinders, Autofrettage, Compound cylinder, end closures.
6. **Design of Spur & Helical gears** – Force analysis in spur gears, Gear tooth failures, material selection, Beam strength & wear strength of gear tooth, Gear design for maximum power transmitting capacity.
7. Terminology of Helical gears, virtual number of teeth, force analysis, beam strength & wear strength of helical gears.
8. **Design considerations of Bevel gear & worm and worm wheel** – Terminology of bevel gears, force analysis, beam strength & wear strength of bevel gears.

9. Terminology of worm gears, proportions of worm gears, force analysis, friction in worm gears, material selection, strength rating & wear rating of worm gears, Thermal considerations.
10. Introduction to CAD & analysis – Introduction to solid modeling package & analysis package, concept of optimum design.

List of Experiments

1. Design projects and drawings sheets based on above topics (Minimum 6 problems)
2. Assignments based on CAD and analysis.

Reference Books

1. Design of Machine Elements - V.B. Bhandari.
2. Mech. Engg. Design - Shigley
3. Design of Machine Elements - Spotts
4. Fundamentals of M/c. Design - Orlov
5. Machine Design - Pandya & Shaha
6. Optimum Design - Dieter
7. Working Manuals of Solid Modelling & analysis package.
8. Mechanics of Spinning Machines – R. Rengaswamy.

FINAL YEAR B. TEXT - SEMESTER-I

7.2 THEORY OF TEXTILE MACHINES-II (TPE)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Subject Total	:	125 Marks

1. **Balancing** - Static and Dynamic Balancing of rotary masses. Balancing machines. Balancing of textile machine components – carding cylinder, spindles of Ring frame.
2. **Toothed Gearing** - Gear tooth terminology and geometry, Condition for constant velocity ratio, velocity of sliding of teeth, form of teeth. Effect of change in central distance on velocity ratio. Length of path of contact, arc of contact for involute teeth. Interference, minimum number of teeth on pinion for involute rack to avoid interference. Minimum number of teeth on gear to avoid interference.
3. **Epicyclic gearing** - Gear trains, determination of velocity ratio and torque in epicyclic gear trains. Study of epicyclic gear trains used in speed frame, carding and comber.
4. **Brakes and Clutches** - Simple band brake, Band & block brake, shoe brake. Different types of clutches – plate & cone clutches. Application to textile machines.
5. **Vibrations** - Longitudinal, torsional vibrations, free and forced vibrations, natural frequency. Whirling of shaft, critical speed.
6. **Antifriction and sliding bearings** - Construction, classification, mounting, maintenance & application to textile machines. Mathematical estimation of static and dynamic load, life of bearing, Selection of antifriction bearing.
7. Different types of drives used in spinning. PIV, VPS, frequency controlled drive and applications.
8. Power required for textile machines. Ring frame, speedframe, carding and looms.

List of Experiments

1. Static balancing of rotary masses.
2. Dynamic balancing of rotary masses.
3. Generation of Involute gear tooth profile.
4. Study of Epicyclic gearing on speed frame / carding / comber / Rapier machine.
5. Study of Brakes.
6. Study of clutches.
7. Calculation of natural frequency of single degree of freedom vibration.
8. Study of forced vibration characteristics.
9. Study of whirling of shaft.
10. Assembly & Dismantling of bearing of spinning / weaving machine.
11. Study of PIV & VPS, frequency control drive.
12. Study of power consumption of a loom or any spinning machine.

Reference Books

1. Theory of Machines - Ballani & Khurmi.
2. Theory of Machines - S.S. Rattan.
3. Mechanics of Textile M/c. Part-I & II - Huntan & Slatter
4. Textile Mathematics Part –I, II, III - Booth.
5. Mechanics of Spinning Machines – R. Rengaswamy.

FINAL YEAR B. TEXT - SEMESTER-I

7.3 MAINTENANCE OF TEXTILE MACHINES (TPE)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	25 Marks
Practical Exam	:	50 Marks
Subject Total	:	175 Marks

1. **Maintenance** – concept, importance, objectives of maintenance, Breakdown & planned maintenance subclassification of planned maintenance, Procedure for planning, schedules for preventive maintenance.
2. **Maintenance of spinning preparatory machines** - schedules, staff, precautions & methods to be followed during maintenance activities, tools & gauges used for maintenance.
3. **Maintenance of Ringframe & Compact Spinning Mechanisms** - schedules, staff, precautions & methods to be followed, Tools & gauges used, Maintenance of Rotor Spinning Machines – Schedules, Precautions, Methods etc.
4. **Study of aprons & cots** used in spinning & their maintenance.
5. **Machine audit** – concept and auditing of spinning machines. Energy conservation in spinning
6. **SQC synchronization with maintenance** – SQC activities useful for maintenance in various departments of spinning.
7. **Maintenance of weaving preparatory machines**, schedules, critical points of maintenance, precautions to be taken during maintenance operations for Winding, Warping, & Sizing machines.
8. **Maintenance of plain & automatic loom** - Schedules, critical points, precautions, mechanism wise auditing of plain & automatic looms.
9. **Maintenance of shuttleless weaving machines** - Approach towards maintenance of latest weaving machines, Critical maintenance points of various shuttleless weaving machines like projectile, rapier, air jet.
10. Recording of maintenance activities & its importance.

11. Introduction to logic & approach of maintenance of chemical processing machines.

List of Experiments

1. Auditing of carding machine and study of card room maintenance machines.
2. Auditing of draw frame, classimat analysis and roller setting.
3. Auditing of speed frame and spectrogram analysis.
4. Auditing of Ring frame and its settings.
5. Auditing of comber and its settings.
6. Study of basic pneumatic circuits.
7. Study of air circuits used on ring frame G5/1, speed frame LF 1400 and Airjet weaving machine.
8. Study of cots maintenance equipments.
9. Auditing and setting of shedding and picking mechanisms of plain loom.
10. Auditing and setting of pirn changing mechanism of autoloom.
11. Auditing and setting of sulzer picking mechanism.
12. Auditing and setting of sulzer shedding mechanism.
13. Mill visit – Spinning Maintenance.
14. Mill visit – Weaving Maintenance.

Reference Books

1. Maintenance manuals by BTRA for various spinning & weaving machines.
2. BTRA monograph series.
3. Spinning machinery maintenance by SITRA
4. Maintenance manuals of different machinery manufacturers of spinning & weaving machines.

FINAL YEAR B. TEXT - SEMESTER-I

7.6 MECHATRONICS (TPE) (ELECTIVE-I)

Lectures : 3 Hrs / Week

Theory Paper: 100 Marks

Subject Total : 100 Marks

I) Introduction

Multidisciplinary approach, scope, elements in mechatronics design, applications, proportional, integral, differential controller, analog & digital controller.

II) Drives in Mechatronics

Electrical motors, stepper motors, servo principle, Hydraulic and pneumatic actuators, variable frequency drives, relays and solenoids, selection criterion for drives.

III) Review of sensors of transducers

Principles & types of transducers and sensors

IV) Ladder diagram fundamentals & PLC

Basic concept, fundamentals, ladder diagram & its construction, PLC - block diagram, interfacing of sensors & actuators, PLC scan cycle, basic PLC programming procedure

V) MEMS Micro electro mechanical systems

Introduction, materials, sensors, actuators, fabrication methods, application of MEMS - Accelerometer, humidity micro sensor

VI) Modelling

Basic concepts, spring, damper, mass/inertia element, equivalent elements in electrical, fluid and thermal systems, model of electrical motor

VII) Design of Mechatronic System

Design process, comparison of traditional and mechatronic design, some case studies piece counting, robotic walking machine. Auto feed and auto doffing, weft selector, yarn clearer systems in textile machines.

VIII) Robotics –

Scope, anatomy, configuration, drives, types of robots, transmission systems, end effectors, applications

IX) Robot Programming –

Methods of programming, limitations, capabilities, various commands in programming

X) Material Handling Applications –

General consideration, task planning, pick & place, loading unloading, inspection and assembly etc.

Reference Books:

1. "Mechatronics" by N. P. Mahalik, Tata McGraw Hill.
2. Mechatronics by M. D. Singh & J. G. Joshi, Prentice Hall Publication.
3. "Introduction to Mechatronics" by David G. Aleiatore & Michael B. Histand, Tata McGraw Hill.
4. "Programmable Logic Controllers" by John W. Webb & Ronald A Reis, Prentice Hall India.
5. "Robotics" by K. S. Fu, R. C. Gonzalez, C. S. G. Lee, McGraw Hill.
6. "Robotics Technology & Flexible Automation" Satyarajan Deb, Tara McGraw Hill.
7. "Industrial Robotics" Mikell P Grover, Mitchell Weiss, Roger N. Nagel, Nicols G. Odrey, McGraw Hill.
8. "Textile Robotics & Automation" by M. G. Mahadevan, Abhishek Publication, Chandigad
9. "Electronic Controls in Textile Machines" NCUTE Training Programme January 2000.

FINAL YEAR B. TEXT - SEMESTER I

7.6 CHEMICAL PROCESSING MACHINERY (Elective I) (TPE)

Lectures : 3 Hrs./week

Theory Paper: 100 Marks

Sub. Total : 100 Marks

1. Maintenance Management

What is maintenance, importance of maintenance, types of maintenance and responsibilities of maintenance department

2. **Shearing, cropping and singeing**

Study of construction, working and maintenance of shearing & cropping machine, surface shearing machine for carpets & terry towels, Gas singeing machine, different positions of singeing, indirect singeing machine

3. Scouring and Washing Machines

Construction & working of kier, study of continuous & batch type open width scouring machines. Slack rope and tight rope washing machine. Batch & continuous washing machine for open width & rope form.

4. Bleaching Machines

Machinery for semi-continuous & continuous bleaching method, J-box unit, vapor lock bleaching range, Bleaching machine for knit goods

5. Mercerizing Machines

Hank mercerizing machine, fabric mercerization machine like pad-chain, pad-chainless & padless- chainless mercerization ranges, Mercerizing machine for knit goods, Liquor ammonia mercerization, Caustic recovery plant, Developments in mercerizing machines

6. Dyeing Machines

Machinery for cotton fibre dyeing, hank, cheese, and cop dyeing machine, Machinery for fabric dyeing like padding mangles, semi-automatic & fully automatic jiggers & jumbo jiggers, winch dyeing machines. H.T. H.P. beam dyeing machines, jet dyeing machine, soft flow dyeing machine. Continuous dyeing ranges

7. Printing Machines

Flat bed printing, rotary screen printing machines. Techniques of screen preparations for flat bed and rotary screen, Study of working & construction of agers & steamers

8. Finishing Machines

Study of working & construction of finishing machinery like vertical drying range, friction calendar, Schriener calendar, felt calendar, stenter machine, float drier, sanforising machine, decatising machine, polymeriser

Reference Books:

1. Handbook Of Textile Processing Machinery - R.S. Bhagwat
2. Technical Specification Of Wet Processing Machinery-National Textile Corporation
3. Maintenance In Chemical Processing- Gokhale & Dhingra
4. Engineering In Textile Coloration- C. Duckworth
5. Tech. Of Dyeing - Dr. V. A. Shenai
6. Tech. Of Printing - Dr. V. A. Shenai
7. Tech. Of Finishing - Dr. V. A. Shenai
8. Tech. Of Bleaching. & Mercerising-. V. A. Shenai

FINAL YEAR B. TEXT - SEMESTER-I

7.6 ENERGY CONSERVATION IN TEXTILES (TPE) (ELECTIVE-I)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

1. **Energy** - Basic types of energy, Basic energy, Fuels. Calculations related to measurement of electrical & thermal energy. Concept of energy management.

2. **Various Energy Sources Used in Textile Process** - Compressed air, steam, fuel, electricity applications in textile processes. Methods of estimation methods of generation of compressed air & steam. Quality requirements of steam & compressed air.

3. **Electrical Energy** - Methods of electricity generation, quality of electric supply, leakages, voltage fluctuations, (economic aspects, limitations) power transmission, cables etc.

4. **Energy Generation From Fuels** - Need of thermal energy in textiles, methods, quality & efficiency of fuels, economics of co-generation, efficient steam generation & utilization.

5. **Energy Audit** - Need of energy audit, method & types of energy audits, energy audit performance, instruments required. Energy consumption of various textile machines.

6. **Conservation of Electrical Energy in Spinning** - Methods of energy conservation in various departments of spinning.

7. Conservation of electrical energy in weaving and humidification plants.

8. Non conventional energy sources and their application areas in textile wind, biogas, solar energy etc.

9. Energy conservation for lighting, water supply, compressed air in Textile Industry.

Reference Books

1) Energy Conservation in Industries – Vol.I & II, Centre of Plant Engg. Services Hydrabad.
2) Conventional Energy Technology – By S.B. Pandya.
3) ATIRA – Circular Report June, 1988, Mill Endavours to conserve electricity by D.H. Shah, J.S. Parajia.
4) Energy Consumption & Conservation in Fibre Producing & Textile Industries – Textile Progress Vol.13, No.3.
5) Renewable Energy Resources by John Twidell.
6) Economy Energy & Environment in Textile Wet Processing by Editor S.S. Trivedi.

FINAL YEAR B. TEXT - SEMESTER-I

7.6 PROCESS CONTROL IN SPINNING (TPE) (ELECTIVE-I)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

1. **Introduction to process management –** Meaning of process management, functional and process management, various phases of process management like planning, organizing, linking of customer feedback and process management, cycle of process management
2. **Raw material management –** Importance, need of instrumental evaluation, traditional methods of cotton selection, importance of cost in raw material, cotton marketing, use of linear programming for mixing, bale management yarn engineering & raw material, practical applications of AFIS & HVI.
3. **Yarn Realization –** Importance, estimation process, norms for various yarns like cotton, blended, analysis of yarn realization from mills.
4. **Process management in blow room & card –** Blow room & card as integrated system, control of waste, cleaning efficiency, neps & fibre rupture, contamination control, selection of proper sequence process parameters, Influence of various factors in blow room & card.
5. **Process management in comber preparatory & combing –** Significance & importance of good lap for comber, evaluation of comber performance, fractionating efficiency of comber, comber waste analysis, influence of various factors on combing performance.
6. **Process management in draw frame & speed frame –** Revision of basic principle of drafting, drafting wave & its significance, roller nip movement, roller speed variation, roller vibration, influence of parameters like speed, setting. Influence of process parameters like flyer speed, twist, break draft and settings, on roving quality, process control in speed frame. Importance and role of stretch control at speed frame.
7. **Process Management in Ring Spinning –** Influence of various parameters on yarn quality, Control of yarn count & strength. Within & between bobbin variation, Role of auto leveller at draw frame, Control of yarn evenness &

imperfection – yarn evenness testing based on mass per unit length, Types of yarn irregularities, measurement causes & assessment of imperfections. Control of yarn Hairiness, measurement, role played by fibre properties & process parameters,

8. **Productivity –** Importance, definition of indices of productivity, analysis & shortfall in productivity, productivity indices, standards, means to improve productivity, productivity of different sections in spinning, comparison & reasons for losses.
9. **End breaks in spinning –** Importance, assessment & controls
10. **Channelization –** Importance & influence of channelizing material in spinning.
11. **Control of classimat faults –** Influence of fibre properties, machine parameters on classimat faults control of faults.
12. **Other yarn & package faults –** Study & control of faults like slubs, crackers, spinners double bad piecing, double gaiting, slough off.
13. **Yarn conditioning –** Influence of conditioning on yarn characteristics, process of yarn conditioning, process management in yarn conditioning.
14. **Introduction to total quality management (TQM) –** Fundamental concepts of TQM, Basic approach, historical review, quality & business performance service quality versus product quality, obstacles.
15. **Organizing for TQM –** The system approach, organizing for quality implementation, switching over from traditional quality to total quality management, roles in transition, small group & employer involvement, team for TQM.
16. **ISO 9000 & Total Quality –** Concept of ISO 9000 series, other quality systems, implementation, documentation, post certification, ISO / QS 9000 elements, internal auditing.
17. **Application of some modes of quality engineering –** Taguchi techniques, factional design, FMEA, TPM

Reference Books

1. Quality Planning & Analysis – Product Development through use by Frank M. Gryna, McGraw Hill International.
2. Testing & Quality Management by Dr. V. K. Kothari, AFL Publication – Process in Textiles.

3. Textile Quality Physical method of Product & Process Control by Mairio Bona COMMETT program of EEC.
4. Process Control in Spinning by A. R. Khare & T. R. Subramaniam, ATIRA Publication.
5. Quality Control in Spinning – SITRA publication.
6. Principles of Roller Drafting by Foster, Manual of Textile Technology.
7. Monograph Series by BTRA.
8. Total Quality Management – A How to program for high performance business by John M. Kelly, Published by Aleycuder, Hamitton Institute Inc.
9. Textile Quality – Physical Methods of Product & Process Control by Mario Bona.
10. Total Quality Management by D. H. Bester Field et al Pearson Education, Inc.
11. ISO 9000 – Meeting the new international standards by Perry L. Johnson McGraw Hill Inc.

FINAL YEAR B.TEXT. - SEMESTER – I

7.1 TECHNOLOGY OF FINISHING-II (TC)

Lectures	:	3 hrs/week.
Practical	:	3 hrs/week.
Theory Paper	:	100 marks.
Term Work	:	50 marks
Subject Total	:	150 marks.

1. Heat Setting

Objects, types of setting, Mechanism of temporary set and permanent set, Structural changes brought about by heat setting. Concept of grey intermediate and post heat setting. Heat Setting conditions of various yarns and fabrics. Industrial practices of heat setting of polyester and its blends. Various methods to determine the degree of heat setting.

2. Antipilling Finishing

Causes of pill formation, Factors affecting pilling tendency, various physical and chemical methods to reduce pilling, Evaluation of efficiency of antipilling finishing

3. Soil Release Finishing

Type of soils, mechanism of soil impingement and soil retention. Mechanism of soil release. Soil release finishing of synthetics & its blends, Evaluation of soil release finishing

4. Spin Finishing

Object of spin finish. Concept of Tribo-electric series and its importance. Spin finishing ingredients and their functions. Various methods of application of spin finishes. Spin finishing of Textured polyester. Problems and remedies in spin finishing.

5. Optical Brightening Agent

Mechanism of whitening action. Concept of saturation and subjective brightness, whitening with a blueing agent, Essential requirements of a good OBA. Chemical classes of OBA. Methods of application of OBA on natural, synthetic fibres

and their blends. OBA suitable for cotton, wool, silk, Polyester, Nylon, Acrylic. Stripping of OBA.

6. Minimum Application Techniques, Energy Conservation and Finishing Formulations

Various Minimum application techniques. Foam Finishing: - Concept of foam and blow ratio. Properties of foam, Factors affecting the stability of foam. Methods to determine the stability of foam. Disperse and condensation methods of preparation of foam. Various techniques of foam application. Drawbacks of foam finishing. Various approaches for Energy Conservation and cost reduction in finishing.

Finishing recipe for 100% PET, polyester/cellulosic blends, P/W blend, etc. Finishing of 100% polyester, polyester/cotton, polyester/viscose, polyester/wool, Acrylic & its blends, nylon & its blends, cotton/lycra blends. Modern evaluation methods like KAWABATA and FAST system.

7. Special Finishes and Recent Advances

Silk like polyester, Antistatic finishes. Finishing of micro denier polyester goods. Recent developments in finishing like nano-finishes, micro-encapsulation. Introduction to finishing of technical textiles.

List of Experiments :

1. Application & evaluation of OBA on Polyester and Nylon
2. Finishing of polyester material for imparting soft, medium & stiff handle.
3. Finishing of 100% polyester suiting.
4. Finishing of 100% polyester shirting.
5. Finishing of carbonized goods.
6. Finishing of polyester / cellulosic blend.
7. Finishing of polyester / wool blend.
8. Application & evaluation of softeners on polyester.
9. Application & evaluation of soil release finish on polyester.
10. Application & evaluation of antimicrobial finish on polyester.
11. Determination of degree of heat setting of various materials.
12. Weight reduction to produce silk like polyester.
13. Fragrances finish by micro encapsulation.

Reference Books :

1. Chemical processing of synthetic and its blends by Dr. K.V. Datye and A.A. Vaidya.
2. Low liquor dyeing and finishing – The Textile Institute, Manchester.
3. Chemical after treatments of textiles by Marks, Atlas and wooding.
4. Textile Finishing by A.J. Hall.
5. Chemical processing of polyester/cellulosic blends by R.M. Mittal and S.S. Trivedi.
6. Technology of Finishing Vol. X, by Dr. V.A. Shenai.
7. Finishing, reference book of textile technologies by ACIMIT
8. Textile finishing by Heywood , SDC Publications
9. Chemical after treatments of textile by Marks, Atlas & Wooding.
10. Textile finishing by A.J. Hall.
11. Introduction to textile finishing by J.T. Marsh.
12. Chemical processing of polyester/cellulosic blends by R.M. Mittal and S.S. Trivedi.
13. Chemical Finishing of Textiles, by W.D. Schindler and P.J. Hauser, Woodhead Publishing Ltd.

FINAL YEAR B. TEXT - SEMESTER-I

7.2 APPAREL MANUFACTURING TECHNOLOGY (TC)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

I) **The Apparel Industry**: Structure of the apparel Industry, sectors of Industry, product types and organization. Nature and size of apparel industry in India, its developments in recent years. Export industry: Size and nature of the industry.

II) **Pattern Making Techniques:** Standard body measurement – Size chart and Measuring of Sizes. Definition of various garments parts & positions. Basic block construction – Block preparation & correction. Figure analysis: Body ideals, body proportion, height, weight distribution, body parts, individual figure analysis, study of body measurement of all age groups. Preparation of basic blocks, muslin pattern, commercial pattern, sizes and its understanding, fabric preparation for garment construction.

III) **Apparel Manufacturing Processes** :

- Fabric Packages – Types of Fabrics – One Way – Two Way Fabrics –Their effect on spreading –Methods of Fabric spreading – Spreading equipments – Computerized spreaders – Marker making –Marker efficiency – Factors affecting marker efficiency – Marker duplicating methods – Computer aided marker making.
- Cutting machines – Types and functions of cutting machines – straight knife, round knife, band knife, cutting machines – Notches, drills, die cutting machines – Computerized cutting machines –maintenance of cutting machines – common defects in cutting & their remedies.
- Stitching: Types of needles – Parts of needles and their function – Needle size - sewing thread – properties of sewing threads – ticket number – fabric sewability. Seam quality – effect of stitch type on seam quality. Selection of seam and stitch.
- Seam and stitches: Classification, basic parts of sewing machine – Needle – Bobbin case /Bobbin hook, Loopers – Loop spreader – Threading fingers – Throat plate – Tongue chaining plates – Takeup devices – Tensioners – Feed

dog – Pressure foot for sewing. Feed systems, , machinery and equipment, basic sewing machines, like general sewing, over locking, safety stitching, blind stitching, button holes, bartacking, & button sewing, special sewing machines like three thread overlock with a microprocessor, Sewing problems, slipped stitches, stay gered stitches, unsalaneed stitching pocker etc.

e) Fusing Technology: Construction of Fusibles, Fusing process, Fusing machinery, quality control.

f) Study of various components such as buttons, zips, underlining, Hooks and ornamental materials, - fly, kissing, lap; Button and buttonholes, hooks and eye snaps, Velcro and other accessories.

g) Pressing Technology: Classification, components of Pressing, machinery and equipments viz. Hand irons, dry iron, electric steam iron, under pressing, top pressing, scissors press,Carousel machines, Steam dolly, tunnel finishing, controls, handling systems, boiler room.

h) Garment Finishing and Inspection: Attaching buttons, marking, sewing labels, cleaning, final touch, fitting quality, live models, measurements, viewing the garments, quality standards.

IV) **Apparel Production Technology**: Manual systems, making through, section system, progressive bundle system, straight line system, mechanical transport systems, selective conveyor belt system, unit production system, quick response sewing system. Ware Housing: Handling equipment, storage equipment, packing equipment.

V) **CAD/CAM in Apparel Manufacturing** - Usage of CAD/CAM in apparel industry, Computerized production planning & control.

Reference Books

1. Introduction to clothing Manufacture by Gerry Cooklin
2. Technology of clothing manufacture by Harrold carr & Barbara Lathem
3. Apparel Manufacturing Handbook by Jacob Solinger.,
4. Clothing construction and wardrobe planning by Dora S. Lewin, Mabel Goode Bowers, Manetta Knttunen — The Macmillan co New York
5. Garment Technology by Dr. V.Subramaniam — Winter School booklets 1990
6. BIS publications 1989.

FINAL YEAR B. TEXT. – SEMESTER - I

7.3 TESTING AND ANALYSIS OF TEXTILES (TC)

Lectures	:	3 Hrs/week
Practical	:	3 Hrs/week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Practical Exam	:	50 Marks
Sub. Total	:	200 Marks

1. Introduction

Importance of testing, Sampling, Statistical terms, Acceptance Sampling and Errors. Introduction to the standards like ISO, ASTM, AATCC and BIS.

2. Colour Fastness of Dyed and Printed Goods

General Principle of colour fastness testing, sample preparation, multifibres, grey scale, conditions of viewing and illumination.

Evaluation of colour fastness to washing and home laundering and various reference detergents; Colour Fastness to Rubbing, Perspiration, Water, Sea water, Chlorinated pool water, Light, Sublimation, Bleaching with hypochlorite and Peroxide, atmospheric ozone, Dry-cleaning and saliva.

3. Evaluation of Functional Finishes

Importance and principle of evaluation of functional finishes like Durable Press Rating, Flammability, soil release, Anti-microbial and Sun Protection.

4. Care Labeling

Introduction, voluntary and mandatory care label, Care label symbols.

Various systems of care label, Instructions for washing, bleaching, drying, ironing, dry cleaning, and placement of care label.

5. Testing and Analysis of Auxiliaries

Surfactants: identification of classes like anionic, cationic and non-ionic, evaluation of solid content and moisture content, effective active content, determination of cloud point and HLB.

Auxiliaries: chelating value of chelating agent, peroxide retention property of stabilizers, evaluation of efficiency of leveling agent, dispersing agent, defoamers. Evaluation of migration and leveling agents.

Softeners: ionic nature of softeners, polymer content, oil content, Active content of cationic softeners.

6. Eco-Testing

Principles of evaluation of Banned amines, Formaldehyde, PCP and heavy metals. Sources of hazards chemicals and their norms.

Certifications like Okö-tex, Organic cotton.

7. Chromatography

Classification of chromatographic methods,

Concept, Principle, Working and Application of Gas Chromatography, High Performance Liquid Chromatography

8. UV-Visible Spectroscopy

Introduction, laws, instrumentation and application of UV – Visible spectroscopy.

9. Other Instrumental Methods of Chemical Analysis

Principle, working and application of Infrared Spectroscopy, Atomic Spectroscopy and NMR.

List of Experiments

1. Evaluation of colour fastness to Washing
2. Evaluation of colour fastness to Rubbing
3. Evaluation of colour fastness to Sublimation
4. Evaluation of colour fastness to Perspiration
5. Evaluation of colour fastness to Light
6. Evaluation of colour fastness to Bleach with hypochlorite and peroxide
7. Evaluation of colour fastness to Saliva
8. Evaluation of dimensional stability to washing, dry heat relaxation shrinkage
9. Evaluation of Flammability.
10. Determination of water repellency – Spray test
11. Determination of free Formaldehyde

12. Determination of Active Content of Leveling agent.
13. Determination of Active Content of Dispersing agent.
14. Determination of Active Content of emulsion softener
15. Demonstration of Eco-Testing at reputed laboratory
16. Evaluation of water extracted from finished fabric
17. Evaluation of Seam Strength.

References

1. Elementary Organic spectroscopy – Principles and Chemical Application by Y R Sharma
2. Spectroscopy of Organic Compounds by P S Kalsi
3. Basic Concepts of Analytical Chemistry, Second Addition by S M Khopkar

FINAL YEAR B. TEXT - SEMESTER-I

7.4 THEORY OF DYEING & COLOUR MEASUREMENTS (TC)

Lectures : 4 Hrs / Week
Practicals : 3 Hrs / Week
Theory Paper: 100 Marks
Term Work : 50 Marks
Subject Total : 150 Marks

I) Fine structure of cotton, wool, silk, polyester, nylon and acrylic, Various proposed theories of fibre structure. Influence of fibre structure, drawing and heat setting on dyeing behaviour

II) Relation between dye molecules and polymeric chains of the fibres, Substantivity and affinity, Thermodynamic derivations of affinity equations, Kinetics of dyeing, Factors affecting kinetics of dyeing, Derivations of various absorption isotherms, Electrical effects in dyeing equilibrium. Monolayer technique and continuous variable method to identify dye – fibre bonds.

III) Glass transition temperature and its effect on dyeability and dye diffusion, Factors affecting dye diffusion, Fick's first and second laws of diffusion, Concepts of equilibrium absorption, diffusion coefficient and time of half dyeing, Derivation of William Landel ferry (WLF) equation and its significance, Free volume and solubility parameter theory of dyeing, Various theories of carrier dyeing. Concept of partition coefficient

IV) Factors affecting reactive dyeing, dyeing of polyester, dyeing of nylon and acrylic, Concept of solid dyeing., reserve dyeing, cross – dyeing and tone on tone dyeing, Continuous Dyeing

V) Relation between light and dye, dye and eye. Light, colour and electromagnetic spectrum, Planckin radiations and colour temp, Daylight and CIE standard illuminants, Sources of artificial light, properties of artificial lights, Interaction of light with matter, Beer Lambert's law of absorption of light

VI) Theories of colour vision, Colour primaries and colour mixing – Additive and subtractive, Colour specification – Munsell colour order system, Ostawald colour system, CIE system, CIE lab, System, Hunter lab, Tristimulus values, Standard observer

VII) Concept of normal optics and reverse optics, Viewing geometry, Bidirectional geometry, circumferential bi-directional geometry, Concept of 2o and 10o observer angle, Concept of specular and diffuse reflection, Factors affecting diffusion of light, Types of monochromators, advantages and disadvantages of each type of monochromators, Precaution to be taken for monochromator, Photodetectors types - PMT & SPD, Principle and working of colorimeter. Principle, advantages and disadvantages of single beam, double beam, dual beam and microflash
spectro photometers, Precautions to be taken for spectro photometer, Reflectance and transmission spectrophotometer, Variables affecting visual and instrumental estimates of colour

VIII) Metamerism and Dichroism. Sample preparation for CCM Application to textile processing, Advantages & limitations of CCM, Colour difference, shade sorting, relative dye strength and tone analysis, Assessment of whiteness, yellowness and brightness, Computing and analysing CCM results, Recipe formulation, batch correction, shade library

List of Experiments

1. Preparation of database of Direct dye.
2. Preparation of database of Disperse dye.
3. Preparation of database of Vat dye.
4. Preparation of database of Sulphur dye.
5. Preparation of database of Acid dye.
6. Preparation of database of Basic dye.
7. Comparison of bleaching methods using CCM.
8. Determination of washing fastness using CCM.
9. Shade sorting using CCM.
10. Determination of Tristimulus values.
11. Recipe prediction using CCM.
12. Estimation of whiteness Index & yellowness index.
13. Determination of relative strength of dye.

14. Batch correction using CCM.
15. Estimation of colour strength difference

Reference Books

1. Physical chemistry of dyeing by Thomas Vickerstaff.
2. Theory of Coloration of Textiles by Alan Johnson, Society of Dyers and Colourists.
3. Computer colour analysis: Textile applications by Dr. A.D. Sule.
4. Instrumental colour measurements and computer aided colour matching for textiles by Dr. H. S. Shah & Dr. R. S. Gandhi.
5. Colour Physics for industry by Roderick Mc Donald.
6. Chemical Processing of Synthetic fibres by Dr. K. V. Datye & A. A. Vaidya.

FINAL YEAR B. TEXT - SEMESTER-I

7.6 ADVANCED POLYMER CHEMISTRY (TC) (ELECTIVE-I)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

I) **Classification and applications of polymers** – classification, thermal analysis of polymers using DSC, TGA, DTA, DMA etc. Reaction engineering of step growth polymerization – Analysis of semi- batch reactors, MWD of ARB polymerization in Homogenous continuous – flow stirred – Tank reactors (HCSTR) advanced stage of polymerization. Reaction engineering of chain growth polymerization – Design of tubular reactors – co-polymerisation – solution of equations describing isothermal radical polymerisation.

II) **Polymer Processing** - Introduction, Extrusion, injection moulding, fibre spinning. Manufacture, properties and application of PF, UF and MF resins. Preparation, properties and applications of epoxide resins.

III) **Polymer diffusion & flow behaviour of polymeric fluids**. Diffusivity of spheres at infinite dilution, diffusion coefficient for non-Theta solutions – free volume theory of diffusion in rubbery polymers – gas diffusion in glass polymers – organic vapor diffusion in glassy polymers – polymer – polymer diffusion. Viscometric flows – Boltzman superposition principle – dynamic mechanical properties – Theories of shear viscosity – constitutive behaviour of dilute polymer solutions – Constitutive behaviour of concentrated solutions and melts.

IV) **Mechanical Properties & Rubber Elasticity** – Rheology Stress – strain behaviour – dynamic mechanical experiments – time temp superposition – polymer fructose – crazing and shear yielding – fatigue failure. Probability distribution for the freely joined chain – Elastic force between chain Ends – Vulcanization of rubber and swelling equilibrium.

V) **Biopolymers & their applications** - Introduction – hetero polysaccharides – lipids – enzymes – microbial polysaccharides – fungal phenolic polymers – lignineous – fungal and bacterial polymers.

VI) **Ionic polymers, synthesis, physical properties and applications** – ion-exchange – Hydrophilicity – Ionomers based on polyethylene – elastomeric

ionomers – ionomers based on polystyrene – ionomers based on PTFE – ionomers with polyaromatic backbones – polyelectrolytes for ion exchange – polyelectrolytes based on carboxylates – polymers with integral ions – polyelectrolyte complexes – biological and inorganic ionic polymers.

VII) **High temperature and fire resistant polymers** - improving low performance polymers for high temperature use – polymers for low fire hazards , polymers for high temperature resistance, aromatic polymers , hydrocarbon polymers – polyphenylene sulphide – polysulphones , polyesters , polyamides , poly ketones ,heterocylic polymers.

VIII) **Polymers with electrical and electronic properties** – study of conducting polymers and conducting mechanisms of polyacetylene , poly paraphenylene ,polypyrole , organo metallic polymers – photo conducting polymers – polymers in non – linear optics , polymers with piezo electric, pyro electric and ferroelectric properties , photo resists for semi conductor fabrication , liquid crystalline polymers.

IX) **Polymer concrete** - polymer impregnated concrete ultra high modulus fibres – polymers for biomedical applications ,polymeric binders for rocket propellants polymer supported reagents , polymers in telecommunications and power transmission – polymers as insulators electrical breakdown strength capacitance , dielectric loss and cable alternation – polymers in telecommunications – Submarine – cable insulation – low fire risk materials – polymers in power transmission – optical fibre telecommunication cables.

Reference Books:

1. Encyclopedia of polymer science & engineering by H.F. Mark (Ed.) John Wiley & Sons, New York.
2. Plastics for electronics by Matrin T. Goosey, Elsevior, Applied science publisher.
3. Flow properties of polymer melts by J.A. Brydson.
4. Principles of Polymer processing by R.T. Fenner.
5. Concise polymeric Materials Encyclopedia – Joseph C salamone,CRC,London.
6. Polymer blends :vol I & II - Formulation D.R.Paul & C.B.Bucknall, wiley interscience publication.
7. Anionic Polymerisation : Henry L.Hsich & Roderie P Quirk ,Marcel dekker,INC.

8. Introduction to Polymeric science and chemistry: A problem solving approach. Manas Chanda,CRC London.
9. High value polymers: A.H.Fawett,the royal society of chemistry,Ireland.
10. Polymeric powder technology : M. narki and ov .Rosenweig.

FINAL YEAR B. TEXT. - SEMESTER - I

7.6 ADVANCED CHEMICAL PROCESSING (TC) (ELECTIVE-I)

Lectures : 3 hrs /week

Theory Paper: 100 marks.

Sub. Total : 100 marks

Chapter 1 Use of biotechnology in Pretreatments

Combined bioscouring and bleaching of cotton fibers, enzymatic degumming, enzymatic bleaching, nano- biotechnology.

Chapter 2 Process modifications in Pretreatments

Developments in singeing, desizing and its eco-aspects, bleaching and its eco-aspects, Eco-friendly peracetic acid bleaching, Eco-friendly retting of Jute, Redox H_2O_2 bleaching, Concept of Eco-friendly stabilizers for H_2O_2 bleaching, Combined operations like desizing- scouring- bleaching, solvent scouring, Hot mercerization, add-on mercerization and ammonia treatment.

Chapter 3 Developments in Dyes and Dyeing Techniques

Dyeing and its eco-aspects, new dyes and their advantages, Eco-friendly dyeing with sulphur & vat dyes. New developments in reactive dyes like HF dyes, low and no salt reactive dyes, multifunctional dyes, neutral fixing and acid fixing reactive dyes, Photo chromic dyes, thermo chromic dyes, fluorescent dyes. Super critical CO_2 dyeing – concept, mechanism, methods and techno-economical features. Ultrasound in dyeing - Concept, mechanism, methods and techno-economical features. Low temperature dyeing - concept, mechanism, methods and techno-economical features.

Chapter 4 Digital Printing

Concept, methods of inkjet printing, colour separation, selection of dyes and developments in inks, techno-economical features

Chapter 5 Transfer Printing

Concept, selection of dyes and paper, mechanism of dye transfer, process sequences, techno-economical features, various transfer-printing machines

Chapter 6 Development in Finishing

Various Low liquor and minimum application techniques in textile finishing, their advantages and limitations, wrinkle free finishing – concept of wet and moist cross linking, various eco-friendly resin finishes, Concept of UV-A and UV-B, factors affecting UV protection. Various UV- protection finishes and their evaluation, antimicrobial finishes – mode of action, factors affecting, various antimicrobial finishes.

Chapter 7 Application of Nanotechnology in Textiles

Nanoscale – Definition, various methods of manufacturing nano materials and their characterization, Nanofibers - Manufacturing, properties and uses of nanofibre, Nanofinishes - Super hydrophobicity and lotus effect, self cleaning, UV protection finish, Antimicrobial finishes

Chapter 8 Application of Plasma in Textiles

Concept, types of plasma and their generation, Plasma treatment of textile for water and oil repellency, Interfacial engineering of functional textiles for biomedical applications, plasma modification of wool, plasma modification of natural cellulosic fibers, characterization of plasma treated textiles.

Reference Books

1. Biotechnology in Textile processing, by Georg M. Guebitz, Artur Cavaco-paulo, Ryszard Kozlowski, The Hawarth Press, Inc.
2. Trouble shooting in Wet Processing: Acetate, Reyon / Lyocell and Spendex Blends, AATCC.
3. Handbook of Jute by T C Ranjan.
4. Eco-friendly Textiles Challenges to Textile Industry – Textile Committee.
5. Textile Energy & Waste Seminar – Textile Institute, 1997.
6. Handbook of Textile processing machinery by R.S. Bhagwat
7. Dyeing of polyester & its blends by Prof. M. L. Gulrajani
8. Engineering in Textile coloration by C. Duckworth

9. Technology of finishing by J.T. Marsh
10. Textile Finishing by Derek Heywood
11. Chemical Finishing of Textiles by W.D. Schindler and P.J. Hauser
12. Nanofibres and nanotechnology in textiles edited by P.J.Brown and K. Stevens
13. The Nanoscope, Encyclopedia of Nano Science & nanotechnology Vol.-I to VI, Dr. Parag Diwan & Ashish Bharadwaj.
14. Nanotechnology in Fibres matures: A New Perspective, Textile Progress, The Textile Institute by Rajesh D. Anandiwala.
15. Principles of Nanotechnology by Phani Kumar
16. Conventional Energy Technology – By S.B. Pandya.
17. Economy Energy & Environment in Textile Wet Processing by Editor S.S. Trivedi.
18. Chemical processing of polyester/cellulosic blends by R.M. Mittal and S.S. Trivedi.
19. Plasma Technologies for Textiles by R. Shishoo

FINAL YEAR B. TEXT. SEMESTER - I

7.6 ENERGY MANAGEMENT IN CHEMICAL PROCESSING (TC)

(ELECTIVE – I)

Lectures : 3 hrs /week

Theory Paper: 100 marks.

Sub. Total : 100 marks

Unit 1 Basics of Energy

Basics of Energy: Types and sources of Energy, Forms of energy and units of measurement, Concept and need of Energy Management, Various Energy Sources required in Textile Processing like thermal, electrical and compressed air

Unit 2 Fuels

Classification of Fuel, Types and Quality of fuels, Efficiency of fuel, Calorific value of fuel and its measurement

Unit 3 Thermal Energy

Need of thermal energy in textile, Basics of thermal energy,

Steam

Thermal behavior of water, heat balance equation, Methods of generation of Steam and its quality requirement, efficient steam generation / boiler, Distribution and Its utilization, size of steam pipe line, accessories in steam distribution line, Calculation related to measurement of thermal energy – Direct heating, Indirect heating, Batch process unit operations, Continuous process and thermopac, Calculation related to measurement of Steam Consumption in textile processing

Thermopac

Need and concept, design of system, rating and energy calculations

Drying of Textile and its economics, machinery required

Co-generation and its economics, advantages

Unit 4 Electrical Energy

Methods of Electricity Generation, Quality of Electric Supply, Leakages, voltage Fluctuations their reasons and economical aspects, Power Transmission and cables, Power Factor, Calculations related to measurement of electrical energy

Unit 5 Compressor

Types, working and quality requirements of compressed air

Unit 6 Energy Audit

Need of energy audit, method & types of energy audits, Energy audit performance, instruments required, Energy consumption of various textile machines, Thermal energy for Batch operation, Thermal energy for Continuous operations, Electricity consumption

Unit 7 Energy Conservation

Thermal Energy - Methods of energy conservation in various departments of process house with regards to thermal energy, Electrical Energy - Methods of energy conservation in various departments of process house with regards to electrical energy, Energy conservation for lighting, compressed air and water, Concepts of Reduce, Reuse and Recycle with textile specific examples, Energy saving through process modification, machine modification or alternative chemical / technology with textile specific examples

Unit 8 Non Conventional Energy Sources

Non conventional energy sources and their application areas in textile like Wind, Biogas and Solar energy either for thermal or electrical energy generation.

Reference Books:

1. Energy Conservation in Industries – Vol.I & II, Centre of Plant Engg. Services Hydrabad.
2. Conventional Energy Technology – By S.B. Pandya.
3. ATIRA – Circular Report June, 1988, Mill Endavours to conserve electricity by D.H. Shah, J.S. Parajia.
4. Energy Consumption & Conservation in Fibre Producing & Textile Industries Textile Progress Vol.13, No.3.

5. Renewable Energy Resources by John Twidell.
6. Economy Energy & Environment in Textile Wet Processing by Editor S.S. Trivedi.

FINAL YEAR B.TEXT. - SEMESTER - I

7.1 GARMENT PROJECT PLANNING & IMPLEMENTATION (FT)

Lectures : 4 hrs/week.
Theory Paper: 100 marks.
Term Work : 50 marks
Sub. Total : 150 marks

1) **Project Planning:** Introduction, Capital investment required for project, Phases of Capital Budgeting, Difficulties in Capital expenditure, Phases involved.
2) **Production Management analysis:** Analysis of techniques for material utilization and cutting of raw materials for all types of sewn products principles and methods of costing, evaluation of equipment for examining, spreading, cutting, marking and ticketing - solution of production problems in spreading, cutting and cost control**.**
3) **Machinery Specification, Selection of Machines:** Selection of machines & machinery specifications required for the product in Shirts, trousers, knit goods, made-ups, suits, ladies dress material etc.
4) **Calculation for no. of machines in garment**: Preparation of organization for clothing industry, departments based on number of pieces and production of finished garment. Calculation regarding machinery, work allotment, production rates, amount of raw material required and no. of machinery required at different stages of garment manufacturing.
5) **Analyze of the planning, layout and logistics in garment manufacturing :** Analyze of the planning, layout and logistics in garment manufacturing, Application of computers in preparing for the production of clothing , Risk Analysis , Optimization of planning , Layout optimization , Logistics in garment industry, symptoms of bad layout. Layout aspects of garment unit.
6) **Site Selection:** Selection of site for Garment industry, General location, Actual selection of specific site, Calculation of spatial requirements, factors influencing site selection, Climatic considerations, geo-technical report, bearing pressure etc. General information about textile & garment manufacturing industry centers in India
7) **Civil/Building Construction:** Consideration in building design, size, shape and configuration of building. Architectural & structural aspects of garment unit

building. Building morphology, General principles of building construction & building functions, Types of factory buildings, Types of building construction. Material for construction with special reference to walls, roofs, floors, false ceilings, fire resistance, sound proof, etc. Colour schemes for buildings, interior & machinery in garment unit. Cost considerations in building construction, organogram of building construction, Team, Tenders & Contract.

8) **Formulation of a Project Report for Garment Units:** Assumptions, Machinery Organizations, Requirement of Miscellaneous Fixed Assets & Machinery Stores & Spares, Requirement & Calculations related to Electrical Power, Lighting, Water, Steam, Compressed Air, etc.

9) **Materials Handling:** Definition and importance of materials handling, functions and principles of materials handling, material handling methods, engineering and economic factors, relationship to plant layout, selection and type of material handling equipments, study of different types of equipments used for materials handling in garment unit

10) **Labour Compliments:** Types of labors required, labors compliment, labors and staff required for garment industry based on workload consideration

11) **Techno-economic Viability:** Calculations of cost of project – Means of Finance – Estimates of sales & production – cost of production – working capital requirement – Profitability Projection – Break even point – Projected cash flow statements

Reference Books:

1. Jacob Solinger., “Apparel Manufacturing Handbook ", Vannostrand Reinhold Company (1980).
2. Gordana Colovic, “Management of Technology Systems in the Garment Industry”, Woodhead Publishing.
3. Bethel, Tann , Atwater and Rung, " Production Control ", McGraw Hill Book Co., New York, (1948).
4. Biegel, John. E., “Production Control ", A Quantitative Approach” Prentice Hall Inc.,(1971) 2nd edition.
5. Apple. J. M., “Plant Layout and Materials Handling ", The Ronald Press Co., New York (1950).
6. Textile Project Management by A. Ormerod, The Textile Institute Publication.

7. Goal Directed Project Management by E.S. Andersen, K.V. Grude & Tore Hang, Coopers & Cybranl Publication.
8. Project, Planning Analysis, Selection Implementation & Review by Prasanna Chandra, Tata McGraw Hill Publishing Co. Ltd.,
9. Management of Textile Production, A. Ormorod. Newnes – Butter Wortrs Publication.
10. Plant location, Layout & Maintenance by Ruddele Reed.
11. Industrial Organisation & Engg. Economics T.R. Banga & S.C. Sharma, Khanna Publishers, Delhi.
12. Norms for Process Parameters, Productivity etc. NITRA.
13. Trade Literature of Different Machinery Manufacturers.

FINAL YEAR B.TEXT. - SEMESTER - I

7.2 INDUSTRIAL ECONOMICS & COSTING OF APPAREL PRODUCTS (FT)

Lectures : 4 hrs/week.
Theory Paper: 100 marks.
Sub. Total : 100 marks

1) Definition of Economics – Nature and scope – Economy types, Problems and Functioning, Basic Terms and concepts.
2) Human Wants – Consumption and standard of living – Demand analysis- consumers surplus – Demand and law of Demand – Elasticity of demand.
3) Theory of Distribution – General – Wages – Trade Unions and Industrial relations.
4) National Income – Concepts and importance – Inequalities of income and employment – Nature and Function of money – Monetary Standards – Theory of money and Prices – Credit and credit instruments – Banking – Central Bank – International Trade – Balance of payment – Foreign Exchange rate determination – Public Finance – Public expenditure – Public Revenue – Taxation , Public debt.
5) Costing: Definition, aims and objectives, difference between estimating and costing. Elements of cost - direct and indirect costs, fixed and variable costs, cost of production, advertisement cost, and selling cost. Various types of costing – Marginal costing, Absorption (full) costing, principles, advantages and disadvantages.
6) Overheads – factory, administrative, sales and distribution. Depreciation: reasons for depreciation, methods of calculating depreciation
7) Pricing: Breakeven point, contribution and profit, CVP analysis, margin of safety, Full cost pricing and marginal cost pricing
8) Costing of garments: factors that determine the price of garments – material cost – cost of sewing thread, cost of fabric consumption, and cost of processing. Factors affecting cost – width of fabric and design, lot size, and cost of components – cutting cost – making and trim cost (CMT cost). Simple problems.

9) Packing & labeling cost – different types and functions. Uses of brand and size label – duty draw back etc. cost of bought out components, thread, Button, Zippers, Interlining, Shipment cost, cost calculation of ladies, Men and children's wear – woven and knitted – simple problems.

Reference Books:

1. Basic Economics by James A. Dgal, Nicholas Karatjas,
2. Applied Economics by Derek T Lobley,
3. Macro Economic Theory by M.C. Vaish,
4. Principles of Economics by D.N. Dwived.
5. Economics Analysis, Decision Making & Policy by George Leland Bach.
6. Elementary Economic Theory by K.K. Dewett & J.D. Varma.
7. Contemporary Economics by Milton H.
8. Johnson Maurice, E. Moore, "Apparel Product Development", Om Book Service, 2001.
9. Katherin McKelvy, "Fashion Source Book", Om Book Service, 2001.

FINAL YEAR B.TEXT. - SEMESTER – I

7.3 ADVANCED GARMENT CONSTRUCTION (FT)

Lectures	:	4 hrs/ week.
Practical	:	3 hrs/ week
Theory Paper	:	100 marks.
Term work	:	50 marks.
Practical Exam	:	50 marks
Subject Total	:	200 marks

1. Fabric Preparation:

Importance of grain in fabric cutting & garment construction, various methods of straightening the grain & fabric ends, Shrinking and Ironing/Pressing the fabric.

2. Sequence of cutting

Laying out the pattern pieces, Economic use of fabric yardage for various width of fabric, marking and transferring the pattern details, cutting

3. Material Handling:

Handling of special fabrics while stitching

4. Fitting

- Principles of good fit
- Sequence of fitting
- Alterations to achieve a good fit
- Fitting problems associated with various garments and solutions

5. Pattern alterations:

General principles & importance of shortening, lengthening of blouse, increasing & decreasing of shoulder slope, increasing the depth and opening of necklines, altering sleeve cap, alternation of patterns for defective/ unusual figures.

6. Advanced Draping

Dress forms, draping of A-line skirt, 6 gore skirt, circular skirt, pant, neckline cowl, side seam cowl, flounces and peplum.

7. Trims and Surface trimmings:

Interfacing, Lining, Buttons, Zippers and other Fasteners, bias trimmings, ric-rac, ruffles, embroidery, smocking, faggoting, lace, appliqué, scalloped edging, decorative fastenings

8. Garment construction:

Logical sequence development for garment construction, construction procedure for: Men's S.B and D.B Coats, Bridal Dress, Children Party wear, machinery and equipments required for the same

9. Speciality Garment Construction:

Construction procedure for: Fire fighting suit, Floaters jacket, Space Suit etc. machinery and equipments required for the same

List of Experiments:

1. Construction of men's casual shirt
2. Construction of men's jeans
3. Construction of ladies trouser by draping method
4. Construction of ladies single piece party wear
5. Construction of men's party wear.
6. Style modification of previously used garment
7. Article development from used garment
8. Construction of floaters jacket
9. Construction of set of children's party wear with any one surface trimming

Reference Books :

1. Pattern Cutting and Making up by Martin Shoben
2. "Basic Pattern Skills for Fashion Design" by Bernard Zamkoft
3. Mary Mathews, "Practical clothing construction-II", "Designing, drafting & tailoring."
4. Natalia Bray, "Metric pattern cutting"
5. "Metric Pattern Cutting for children's wear" Winifred Aldrich
6. Patternmaking for Fashion Designers Lori A . Knowles
7. "More Dress Pattern Designing" Natalie Bray
8. "Patternmaking for Fashion Design", Helen Joseph Armstrong

FINAL YEAR B.TEXT. - SEMESTER – I

7.5 FASHION ACCESSORIES (FT) (ELECTIVE-I)

Lectures : 3 hrs/week.
Theory Paper: 100 marks.
Sub. Total : 100 marks

1. Introduction to accessory -definition, history and classification.
2. Accessory types. Head gears, footwear. bows, ties and belts, hand bags, and gloves and Mitts, Scarves, stoles and stacking, Sun glasses, Umbrellas
3. Materials and processes. Materials required material sourcing, design development and production, Eco-standards followed during the process.
4. Fashion trends and merchandising of accessories, Economic importance, Accessory Designers, Major Brand players.
5. Jewellery design and production. Types of Jewellery- Traditional Jewellery, Earrings, necklaces and bangles, Rings, pedants, bracelets and anklets. Textures and finishes given for the jewellary.
6. Introduction to gems, basic qualities of gems,
7. Travel accessories – kits, bags, trolley, suitcase
8. Seasons and fashion accessories

Reference Books :

1. John Peacock, " The complete 20th Century Source Book", Thames and Hurlson, London, 2000 John
2. Peacock, " Fashion Accessories- Men", Thames and Hudson, London, 1996
3. Claire Billcocks," Century of Gavin Bags", Chartwell Books, New Jersey 1997
4. Malolow Blahnik- Co Collin Mac dolw, " Shoes -Fashion and Fantasies", Thames and Hudson, 1989
5. Gavin Waddell, “How fashion works” , Blackwell Publishing
6. Phyllis Tortora “The Fair child Encyclopedia of Fashion Accessories”, OM publishers
7. Gini Stephens Frings, “Fashion from concept to consumer”, Seventh edition
8. Dr. M.S. Sheshadri, “Apparel Marketing and Merchandising”

FINAL YEAR B.TEXT. - SEMESTER – I

7.5 INTELLECTUAL PROPERTY RIGHTS (FT) (ELECTIVE- I)

Lectures : 3 hrs/week.
Theory Paper: 100 marks.
Sub. Total : 100 marks

1. Introduction - Invention and Creativity - Intellectual Property (IP) - Importance - Protection of IPR - Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property).
2. IP - Patents - Copyrights and related rights - Trade Marks and rights arising from Trademark registration - Definitions - Industrial Designs and Integrated circuits - Protection of Geographical Indications at national and International levels - Application Procedures.
3. International convention relating to Intellectual Property - Establishment of WIPO - Mission and Activities - History - General Agreement on Trade and Tariff (GATT).
4. Indian Position Vs WTO and Strategies - Indian IPR legislations - commitments to WTO-Patent Ordinance and the Bill - Draft of a national Intellectual Property Policy - Present against unfair competition.
5. Introduction and overview of Cyber Intellectual Property; Intellectual property and cyberspace; Emergence of cyber crime ; Grant in software patent and Copyright in software; Software piracy; Trade marks issues related to Internet (Domain name); Data protection in cyberspace; E-commerce and E-contract; Salient features of Information Technology Act; IPR provisions in IT Act; Internet policy of Government of India.
6. Case Studies on - Patents (Basumati rice, turmeric, Neem, etc.) - Copyright and related rights - Trade Marks - Industrial design and Integrated circuits - Geographic indications - Protection against unfair competition.

References Book :

1. Subbaram N.R. “Handbook of Indian Patent Law and Practice ", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.
2. P. Narayanan – Intellectual Property Law.

3. Cornish William – Intellectual Property.
4. Ganguli – Intellectual Property Rights: Unleashed the knowledge economy.
5. Copinger & Skine James – Copyright.
6. Pal P. – Intellectual Property Rights in India.

Reference Books :

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. [www.ipmatters.net/features/000707_gibbs.html.

FINAL YEAR B. TEXT - SEMESTER-I

7.5 HOME TEXTILES IN FASHION (FT) (ELECTIVE-I)

Lectures : 3 Hrs / Week
Theory Paper: 100 Marks
Subject Total : 100 Marks

I) Textile for seating – Upholstery fabrics for domestic applications – scope, fixed upholstery, non-stretch loose covers, stretch covers. Upholstery fabrics for contract use – general, automotive applications, Commercial applications.

II) Window Textiles – Sun filters (Sheers and nets), Semi-sheers, Reflective textiles, curtain fabrics & drapes, Blinds.

III) Bed Textiles – Sheets & Pillow Cases, Quilted Textile, Blankets & Rugs - Jacquard blankets, Printed blankets, Fire proof blankets, Baby blankets. Bed Spreads, Mattress covers, (Ticking)

IV) Fabrics for Wall Covering, Textile Art – Tapestries, Wall hangings, Textiles for screens & Room Dividers.

V) Bathroom Textiles - General shower curtains, Terry Toweling.

VI) Accessories – Scatter Cushions, Floor Cushions, Lampshade fabrics.

VII) Table Textiles – Tablecloths – Colour – Woven & Printed type, jacquard types, embroidered types, non-woven types. Table mats – Colour -woven, Printed jacquard, embroidered.

VIII) Textile Floor Coverings – Introduction, Pile Fibres, Backing fibres & fabrics – Tufted carpets, woven carpet. Woven Carpet Manufacture, Aximinster, Tufted Carpet Manufacture – Needling machinery textured & patterned needle felts, thermo-bonded products. Unconventional methods for making carpets – Bonding, knitted carpet, stitch bonding, flocking.

IX) Towels: - Types of towels, Bath robes, Beech Towels, Kitchen Towels, Terry towels, Napkins - Construction, weave, pile height, patterning, production, dyeing, finishing, etc.

X) Velour - Types of velvets – Jacquard, Dobby, Plain, Printed – Manufacture & construction. Methods of velour making by cutting and shearing.

XI) Kitchen Textiles:-Aprons, Dish cloth, Teacosy, Bread bag, Mittens, Pot Holders, Table Mats – Construction & manufacturing details.

XII) Evaluation of Home Textiles: - Introduction, Test Method for towels, rug and Home textiles

XIII) Finishes used in home textiles: - Introduction, protection against unpleasant adour, temperature regulated beddings, Antimicrobial finish, Moisture management finish, Towel finishing, Nanotechnology based home textiles enhancements.

Reference Books

1. Textile Floor coverings by G.H. Crawshaw, Textile Progress, Vol.9, No.2, The Textile Inst. Publisher.
2. Interior Furnishings', Textile Progress, Vol.11, No.1, By Mortimer O.Shea, The Textile Inst. Publication
3. Performance of Home Textiles, Subrata Das, Woodhead Publications India Pvt Ltd.
4. Carpets: Back to Front, Textile Progress, Vol.19, No.3 by – L Cegielka MA, The Textile Inst. Publication

FINAL YEAR B.TEXT. - SEMESTER – I

7.6 PROCESS MANAGEMENT IN APPAREL & FASHION INDUSTRY (FT)

Lectures : 4 hrs/week.
Practical : 3 hrs/week.
Theory Paper: 100 marks.
Term Work : 50 marks.
Sub. Total : 150 marks

1. Introduction to Process Management:-

Meaning of process management, Objective, Scope and approach to achieve maximum quality, production, productivity, efficiency with minimum of cost, Methodology adopted for the same. Various phases of process management, key variables of process management.

2. Product Development:-

Understanding customer needs & process flowcharts, establishing steps from prototype to production model, Importance of pre-production activities; Introduction to timetable concepts. Product data management: Understanding and interpretation of specification sheet. Analyze process data, Design (Redesign) the process. Managing lead time.

3. Operation Sequence Development:-

Garment breakdown with machine and attachment details, development of production grid for garment construction, development of production flowchart.

4. Bundle Tickets:-

Guidelines for bundle ticket design, functions of bundle tickets, bundle ticket control. Different manufacturing systems: Make through and Assembly line manufacturing - advantages and disadvantages. Lay lot planning: Numerical exercises on lay lot planning to optimize cutting cost, bundling, ticketing and cutting room control formats.

5. Production Planning and Control:-

Definition, Importance, Various terms related to capacity – committed capacity, planned capacity, required capacity, potential capacity. Managing plant capacity,

SAM calculations. Learning curve. Line balancing – Determination and allocation of manpower and machines for balanced production in existing plant for a given target.

6. Quality in Product Development:-

Evolution of quality concepts: SQC, TQC, TQM, ISO 9000, Japanese participative management system, Kaizen, SMED, 5 S system. Cost of quality conformance and non-conformance. Work study in garment industry, Methods to control time and cost. Quality inspection of fabrics, different types of defects in fabrics - minor and major defects, their remedies. Inspection of defects – 4 point and 10 point systems. Quality assurance in garment development like pattern making, cutting and garment construction: Inspection procedures to avoid problems, quality standards and tolerances. Coordinating departmental activities. Quality monitoring of trims and accessories. Quality standards for packing materials, packed goods, warehousing and shipping.

List of Experiments :

1. Preparation of operational break down for T-shirt.
2. Preparation of operational break down for formal shirt
3. Preparation of operational break down for trouser.
4. Preparation of operational break down for jeans.
5. Calculate line efficiency in a garment unit.
6. Quality inspection of fabrics and garments.
7. Determination of SAM for garment manufacturing operations.
8. Conduct method study for garment manufacturing operations.
9. Study and preparation of plant layout of a garment unit.
10. To carry out various settings in specialty machines.
11. To prepare costing for woven garments.
12. To prepare costing for knitted garments.

Reference Books :

1. A.J. Chuter., " Introduction to Clothing Production Management ", Blackwell Scientific Publications
2. David J. Tyler., " Materials Management in Clothing Production ",
3. Blackwell Scientific Publications Professional Books.

4. Grover E G and Hamby D. S " Hand Book of Textile Testing and Quality Control", Wiley Eastern Pvt. Ltd., New Delhi, 1969.
5. Jacco Solinger, "Apparel Manufacturing Handbook", Prentice Hall, 1993
6. Sammel Eliou, "Production Planning & Control", Wiley Eastern Pvt. Ltd..
7. Ruth E. Glock " Apparel M anufacturing"

FINAL YEAR B. TEXT - SEMESTER-II

8.1 PROCESS MANAGEMENT IN YARN FORMING-II (TT/MMTT)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Practical Exam	:	50 Marks
Subject Total	:	200 Marks

I) Process Management in Ring Spinning –

a) Influence of various parameters on yarn quality

b) Control of yarn count & strength. Within & between bobbin variation, Role of auto leveller at draw frame.

c) Control of yarn evenness & imperfection – yarn evenness testing based on mass per unit length, Types of yarn irregularities, measurement causes & assessment of imperfections.

d) Control of yarn Hairiness, measurement, role played by fibre properties & process parameters.

II) Productivity – Importance, definition of indices of productivity, analysis & shortfall in productivity, productivity indices, standards, means to improve productivity, productivity of different sections in spinning, comparison & reasons for losses.

III) End breaks in spinning – Importance, assessment & controls

IV) Channelization – Importance & influence of channelizing material in spinning.

V) Control of classimat faults – Influence of fibre properties, machine parameters on classimat faults control of faults.

VI) Other yarn & package faults – Study & control of faults like slubs, crackers, spinners double bad piecing, double gaiting, slough off.

VII) Yarn conditioning – Influence of conditioning on yarn characteristics, process of yarn conditioning, process management in yarn conditioning.

VIII) Maintenance of spinning machines – Types of maintenance, specific maintenance activities from blow room to ring spinning which directly reflect on yarn quality.

IX) On & off line monitoring systems in spinning centralized data collection systems control of foreign fibre & contamination.

X) Production Costing and Parameters influencing the production cost.

XI) Total Quality Management -

a) Leadership – Concepts, implementation, role of senior management, management role in quality, characteristics of leaders, Ethics & shared values, communication management systems, Decision making.

b) Customer focus & satisfaction – Customer perception of quality, process versus customer, feed back, service quality customer relation & profitability, buyer supplier relationship, supplier partnership, continuous process improvement, Juran Trilogy, Problem solving method "Kaizers" reengineering.

c) Bench Marking – The evaluation & essence of bench marking, reasons to benchmark, Benefits of bench marking, strategic bench marking, operational bench marking, planning, studying, learning using the findings, pitfalls & criticism of bench marking.

d) The Cost of Quality – Definition, three views of quality costs, measuring quality costs, use of quality cost, information, accounting systems, activity based costing.

List of Experiments

1. To study role of auto leveller on yarn quality.
2. To study effect of break draft on yarn quality.
3. To study effect of spacer on yarn quality.
4. To study effect of different spindle speeds on yarn quality.
5. To study effect of different travellers on yarn quality.
6. Collection of technical auditing information about spinning machines.
7. To study display & data system related to different ring frames.
8. Effect of yarn conditioning on yarn properties.
9. To study hairiness of yarn produced on different ring frames.
10. To study hairiness of yarn produced on different ring frames.
11. To compare yarn qualities of compact & normal yarn.
12. Mill visit – To observe idle spindle, end breaks & material channeling.
13. Mill visit – To evaluate blow room cleaning, waste Noil % & Soft waste.

Reference Books

1. Uster Statistics 2004.
2. Statistical Quality Control – T. V. Ratnans
3. Methods of Statistics – SITRA
4. Process Control in Spinning by A. R. Garde & T. R. Subramiam ATIRA
5. Process Control in Spinning – Dr. K. R. Salhotra
6. End Breaks in Ring Spinning – ATIRA
7. Maintenance Manuals of LMW, Rieter, Trutzschler
8. Yarn Hairiness by A. Barella Textile Progress Vol 13 No 1 Textile Institute.
9. Quality Circle – A Movement for Progress – J. B. Zende, Quality Circle Forum of India.
10. Techniques for Quality Engineering by Philips Ross McGraw Hill Publication.
11. Quality Planning & Analysis Frank, M. Grayna, McGraw Hill Publication.
12. Quality Samurai, Designal Pathways for TQM Implementation by T. R. Nataraja Edwina Pir.
13. Costing in Textiles – SITRA Publication

FINAL YEAR B. TEXT - SEMESTER-II

8.2 PROCESS MANAGEMENT IN FABRIC FORMING-II (TT)

Lecture	:	3 Hrs / Week
Practical	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Practical Exam	:	50 Marks
Subject Total	:	200 Marks

I) Process management in weaving (loom shed) for Fabric quality

a) Causes & remedies for yarn related faults: Weft bars, black ends, slub, and thick end, Double end.

b) Causes and remedies for following fabric defects on ordinary and automatic looms & shuttle less looms. Warp streaks, Reedy, bad selvedges (curly, broken, wavy, rough) missing ends, floats, cracks, thick places and starting marks, Weft loops, snarls, stains, broken and double picks, Lashing-in, Smash, Weft slough, temple roll mark, Emery roll marks, box marks, gout, furrow appearance in terry pile, uneven fabric

c) Causes and remedies for defects on shuttle less looms for projectile, Rapier & Air jet weaving machines.

II) Fabric quality evaluation systems such as manual and automatic fabric inspection methods, various point grading systems

III) Process management in weaving for productivity:

a) Maintaining of loom speed on various weaving machines, limitations on maximum speed from textile point of view, mechanical condition causing reduction in speed.

b) Factors affecting calculation of correct loom shed efficiency,

c) Control of Technical, Human and organizational factors affecting loom shed efficiency.

d) Assessment of loom performance after corrective actions

e) Control of down time through SMED technique

f) Use of snap study in controlling efficiency losses

g) Management information system to control productivity

IV) Maintenance of machines in weaving

a) Equipment deterioration and need of maintenance,
b) Basic prerequisites and factors affecting maintenance activity
c) Importance of maintenance, types and objectives of maintenance activities,
d) Concept of preventive maintenance (PM) comparison with breakdown maintenance
e) Work activities in preventive maintenance: cleaning, lubrication, inspection (in detail),
f) Steps in implementing preventive maintenance scheme.
g) Levels of preventive maintenance: distribution of short, medium and long trem maintenance activities
h) Benefits of preventive maintenance and limitations
i) Cost of maintenance: elements of cost, direct & indirect costs.
j) Maintenance of shuttle less weaving machines

V) Study of warp and cloth control

Pick spacing, cloth fell position, Causes for pick space variation, bumping condition-theory, causes and remedies, research by Dr. Greenwood et al

VI) Study of warp and weft tension during weaving

Tension variations on automatic and shuttle less looms
Acceleration and retardation behavior of weft for all shuttle less looms

VI) **Weaving of specialty yarns and fabric**

Filament weaving, weaving with high twist and PC blend yarn, glass fiber tyre cord, parachute cloth, preparation of patterned warp

VII) **Computers and information technology in textiles**

VIII) **Study of research articles for process management in fabric forming.**

List of Experiments

1. Adjustment of torsion bar to change the picking force on sulzer weaving machine and find its effect on working of loom by operating the loom.

2. Changing the rapier stroke, weft tension for different fabric widths and find its effect on the working of the rapiers and loom by operating the Flexible rapier loom
3. Changing the rapier stroke, weft tension for different fabric widths and find its effect on the working of the rapiers and loom by operating the Rigid rapier loom
4. Working of air jet machine with different air pressure combinations, blast timings and blast durations
5. Estimation of shuttle entry and exit of the shuttle on plain, bobbin changing auto loom and shuttle changing auto loom
6. Changing input yarn tension and fabric take down tension to find their effect on the stitch length on single jersey knitting machines
7. Changing input yarn tension and fabric take down tension to find their effect on the stitch length on Double jersey knitting machines
8. To find cost per meter for the given woven fabric considering all elements of the cost in the small scale manufacturing unit
9. To find cost per meter for the given knitted fabric considering all elements of the cost in the small scale manufacturing unit
10. Fabric Analysis 2 samples
11. Fabric Analysis 2 samples
12. Fabric Analysis 2 samples

Reference Books

1. Process Control in Weaving by M.C. Paliwal & P.D. Kimothi
2. Weaving: Technology and Operations by Allan Ormerod.
3. Weaving Machine, Mechanisms, Management by Dr. Talukdar, Ajagaonkar, Sriramulu.
4. ATIRA, BTRA Publications for Norms on Winding, Warping, Drawing in Looms.
5. Machine Manuals of Various Shuttle less Looms and – Preparatory Machines.
6. Preventive Maintenance of Plain and Auto Loom – By BTRA.
7. Manual of shuttle less Weaving: PSG College Publication.
8. Shuttle less Weaving: NCUTE Publication.

FINAL YEAR B. TEXT - SEMESTER-II

8.3 TEXTILE MILL MANAGEMENT (TT/MMTT/TPE/TC)

Lectures : 3 Hrs / Week

Theory Paper: 100 Marks

Subject Total : 100 Marks

I) Management – Nature, Importance, Elements, Levels of Management, Fundamental Managerial Skills, Functions of Management – Henry Fayol's Principles of Management - Social responsibilities a Manager.

II) Planning – The Nature, Characteristics & Process of Planning – Forms of Planning.

III) Organizing – The Nature, Importance & Steps involved in the process of organizing - Staffing - meaning, definition, importance and process. Types of organization structure

IV) Staffing – Human resource management & selection - Performance appraisal.

V) Leadership – Meaning & Importance – Motivation: Theory X and Y – Leadership - Communication.

VI) Controlling: Meaning, Concept, Definitions, Steps in control process, Techniques and Types of control, Requirements of an effective control system.

VII) Cost Accounting, Budget and Budgetary control – Introduction to Costs – Types of cost – Depreciation – Breakeven analysis – Budget – Definition – Objectives of Budgets, Advantages of Budget, Limitations of Budget, and Types of Budget – Budgeting & Budgetary Control

VIII) Financial Management - Balance sheet – Profit loss statement – Financial ratios.

IX) Marketing - Evolution of marketing, Nature of Marketing, Core concepts of marketing – Marketing Mix – Introduction – Product Life Cycle.

X) Marketing Research – Meaning, Scope, Limitations of Marketing Research - Marketing Research Procedure – Types & Techniques.

Reference Books

1. Essential of Management – by Harold Koontz & Heinz, Weihrich – Tata McGraw- Hill Publishing Company Ltd., New Delhi.
2. Advanced Cost & Management Accounting by P.K. Sikdar – Viva Books Pvt. Ltd., New Delhi.
3. Industrial Engineering & Management by O.P. Khanna & A. Sarup, Dhanapat Rai Publications (P) Ltd., Delhi.
4. Dynamics of Entrepreneurial Development & Management by Vasant Desai – Himalaya Publishing House – Delhi.
5. How to Read a Balance Sheet – An ILO Programmed Book – Oxford & IBH Publishing Co. Pvt. Ltd., Delhi.
6. Enterpreneurial Development by S.S. Khanta , S. chand & Company Ltd., Delhi 110 055.
7. Fundamentals of Marketing by W.J. Stanton, M.J. Etzel B.J. Walker – McGraw-Hill, Inc – New York, St. Laouis etc.
8. Industrial Organisation & Engineering Economics by S.C. Sharma & T.R. Banga Khanna Publishers – 2-B, Nath Market, Nai Sorak, Delhi – 110 006.
9. Marketing Management By Philip Kotler – Prentice – Hall of India Pvt. Ltd., New Delhi – 110 001.
10. Managing Human Resource by Luis R. Gomer Mejia, D.B. Balkin & R. L. Cardy. Pearson Education (Singapore) Pvt. Ltd., Indian Branch, 482 FIE Delhi, India.
11. Cost Accounting by M.E. Thukaram Rao, New Age Internation (P) Ltd., Publishers New Delhi.
12. Project Management by K. Nagaraja, New Age Internation (P) Ltd., Publishers – New Delhi, Bangalore etc.
13. Human Resource Management by Barry Cushway – British Library Cataloguing in Publication data – Published in association with Price Water House Coopers.
14. Management of a Small Scale Industry – Vasant Desai, Himalalya Publishing House, Delhi, Nagpur.
15. Project Management the Managerial Process by Gray & Larson, Tata McGraw Hill Publishing Co. Ltd., New Delhi.

16. Advanced Cost & Management Accounting (Problems & Solutions) by V.K. Saxena, C.D. Vashist, Sultan Chand & Educational Publishers, 23, Daryaganj, New Delhi, 110 002.

FINAL YEAR B. TEXT - SEMESTER-II

8.4 TECHNICAL TEXTILES (TT/MMTT)

Lectures : 4 Hrs / Week

Theory Paper : 100 Marks

Subject Total : 100 Marks

I. **Introduction** - Definition and scope of Technical Textiles – Development stages in Technical Textiles – present status and future trends in Technical Textiles – Areas of Application of Technical Textiles and Classification.

II. **Coating & Lamination Textiles** - Introduction –materials for coating – Substrate for coating – Coating methods - Fusible interlinings – physical properties of coated fabrics - Laminating – Applications of coated fabrics and Laminated Textiles.

III. **Heat and Flame Protection Applications** – Flammability, thermal characteristics and combustion mechanisms of fibres, prevention of combustion – Flame retardant fibres suitable for protective clothing –Testing of Flame retardant and Flame proof fabrics.

IV. **Filtration Application** – Introduction –Fabric construction & Finishing Treatments, Solid-liquid separation, liquid – liquid filteration, liquid-gas separation, Mechanism of filteration,.

V. **Medical Textiles** – Introduction – Non implantable materials, Extra corporeal devices – Implantable materials - Health care / hygiene products.

VI. **Textile Reinforced Composite Materials** – Introduction to composite materials – Textile reinforcement – Applications of composites in brief.

VII. **Textiles in Transportation** – Introduction, Textiles in passenger cars – Textiles in other road vehicles – Rail applications – Textiles in Air crafts – Marine application.

VIII. **Textiles in Defence** – Introduction, Historical Background – Criteria for modern military textiles materials – various application of Textiles in various areas of defence such as environmental protection, thermal insulation, water proof water vapour permeable materials – ballistic protection – heat protection – biological and chemical warfare protection, High altitude fabrics, etc.

IX. Review of Geo technical application of Textiles

X. **Miscellaneous Applications** – Electrical insulation – Battery separators – synthetic turf and sports application – sound insulation –power transmission, parachute textiles, ropes, cordage and twines.

XI. **Narrow fabric production methods** - Applications in Technical Textiles.

Reference Books

1. Hand book of Technical Textiles Edited by A.R. Horrocks & S.C. Anand. Woodhead Publication. Ltd. England.
2. Wellington Seass Handbook of Industrial Textiles by Sabit Adanur, Technomic Publication Co. Lancaster.
3. Electrostatic Charging of Textiles, Textile Progress Vol.28, No.1 BY I. Holme, The Textile Institute Publication.
4. High Performance Fibres, Textile Progress, Vol.25, No.3/4, By S.K. Mukhopadhyay, Textile Institute Publication.
5. Medical Textiles 96, Conference Proceeding, by Bolton UK, Woodhead Publication Ltd.,
6. The Production & Properties of Narrow Fabrics, Textile Progress, Vol.8, No.4, By – J.P. Turner, The Textile Institute Publication.
7. Protective Clothing, Textile Progress, Vol.22, No.2/3/4, By P.W. Harrison, The Textile Institute Publication.
8. Needle Punching by A.T. Purdy The Textile Institute Publication.
9. Barrier Fabrics for Protection Against Aerosols' The Textile Progress, Vol. 26, No.1, By S.M. Maini, The Textile Inst. Publication.
10. Automotive Textiles, Textile Progress, Vol.29, No.1/2 by S.K. Mukhopadhyay & J.F. Partridge, The Textile Inst. Publication.
11. The Thermal Insulation Properties of Fabrics Textile Progress, Vol.24, No.4, J.O. Ukponmwan, The Textile Inst. Publication.
12. Thermal Bonding of Non woven fabrics, Textile Progress, Vol.26, No.2, The Textile Inst. Publication
13. Industrial Application of Textile : Textiles for Filtration and Coated fabrics Textile Progress, Vol.14, No.1, By Pushpa Bajaj & A.K. Sengupta, The Textile Inst. Publication.
14. Developments in Non-woven fabrics Textile Progress Vol.12by A.T. Purdy, Textile Institute Publication.

15. Journal of The Textile Institute Vol.81, No.4 By P.W. Harrison, The Textile Inst. Publication
16. TIWC-96 Niches in the world of Textile Vol, World Conference by TTI, The textile institute publication.
17. Industrial Application of Textiles by K.L. Floyd, Textile Progress Vol.6 No.2 The Textile Institute Publication.
18. Medical Textile – International Conference, Bolton UK.
19. Progress in Textiles : Science and Technology, Vol 3,Technical Textiles: Technology,Development & Applications By Dr. V K Kothari, IAFL Publications, New Delhi.
20. Textiles in Automobile Enginnering: Fung & Warner.

FINAL YEAR B. TEXT - SEMESTER-II

8.5 FASHION TECHNOLOGY IN APPARELS & MADE-UPS (TT/MMTT/TPE/TC) (ELECTIVE-II)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

I) Fashion: Fashion terminology, Origin of fashion, Fashion cycle, Fashion industry, factors affecting fashion, Fashion adaptation theories. Major fashion centers of the world: Brief introduction to world fashion centers- American, European, Japanese and Indian; Fashion houses and designers. Fashion designing, apparel designing and fashion technology.

II) Design: Elements and principles of design: Line, colour and proportion emphasis. Design process: Designers' functions -Inspiration files, sketches, how to interpret designs, story Board / Fabric story; The design studio, sampling.

III) Fashion Theories – Fashion of direct eras. French revolutions.

IV) Psychology of clothing – first impression, role of socio – psychological and economical aspects of clothing.

V) Retailing: Various types of retailers, Franchise retailing, garment retailing, private labels and others, department stores, specialty stores, chain retailers, mail order houses, shopping malls. Designer labels Vs Brands, Analysis of designer’s labels. Licensing and franchising.

VI) Fashion information services: Trend forecasting and auxiliary services. Forecasting trends: Purpose of forecasting trends, how to use forecasting services. Fashion promotion and communications: Trade fairs, Fashion shows.

VII) Definition of merchandising - functions of merchandising division - Role and responsibilities of a merchandiser- different types of buyers -Communications with the buyers - awareness of current market trends – product development - line planning line presentation.

VIII) Anatomy for designers, Human proportion and figure constructions. Head the unit of measurement, methods of determining individual proportions, Basic

drawing of the fashion figure – flat sketching, average proportions methods of determining standards of women's figure.

IX) Drawing the lay figures – Three quarter view of lay figure – proportions of the figure measuring eight heads. Sketching and illustrations of body figures & body shapes.

X) Introduction to historic costumes. Introduction to fashion accessories, history, classification and recent trends. Use of leather in apparel.

XI) Computer application in fashion designing.

Reference Books

1. Elements of fashion and apparel design by Sumathi G.J.
2. Fashion design and product development by Harold Carrl John Pomeror.
3. Instructing fashion by Kathryn Mckelvey and Janine Munsbw.
4. "Art in Every day life" Calcutta - IBH Pub. Co. by Gold Stein & Gold Stein (1972)
5. "Inside Fashion Design" by Tate (1977) Sharon Lee.
6. Clothing of models by Erain Mabel.
7. Michael P. Grover & Computer Aided Design & Manufacturing.
8. Brockman, H.L., " The theory of Fashion ", John Wiley & Sons, (1965).
9. Kawashima, Masazki, " Fundamentals of Men's Fashion Design ", Fairchilds publications (1976).
10. Jarnow, J.A., and Judelle B., " Inside the Fashion Business ", JWS (1974) 2nd edition.
11. Barton, Roger " Advertising Handbook ", Prentice Hall Inc (1956).
12. Swinney, John B, " Merchandising of Fashion ", Ronald press (1942).
13. Jacob Solinger., " Apparel Manufacturing Handbook ", VanNostrand Reinhold Company (1980).

FINAL YEAR B. TEXT - SEMESTER-II

8.5 HOME TEXTILES (TT/MMTT) (ELECTIVE-II)

Lectures : 3 Hrs / Week
Theory Paper: 100 Marks
Subject Total : 100 Marks

I) Textile for seating – Upholstery fabrics for domestic applications – scope, fixed upholstery, non-stretch loose covers, stretch covers. Upholstery fabrics for contract use – general, automotive applications, Commercial applications.

II) Window Textiles – Sun filters (Sheers and nets), Semi-sheers, Reflective textiles, curtain fabrics & drapes, Blinds.

III) Bed Textiles – Sheets & Pillow Cases, Quilted Textile, Blankets & Rugs - Jacquard blankets, Printed blankets, Fire proof blankets, Baby blankets. Bed Spreads, Mattress covers, (Ticking)

IV) Bathroom Textiles - General shower curtains, Terry Toweling.

V) Table Textiles – Tablecloths – Colour – Woven & Printed type, jacquard types, embroidered types, non-woven types. Table mats – Colour -woven, Printed jacquard, embroidered.

VI) Textile Floor Coverings – Introduction, Pile Fibres, Backing fibres & fabrics – Tufted carpets, woven carpet. Woven Carpet Manufacture, Aximinster, Tufted Carpet Manufacture – Needling machinery textured & patterned needle felts, thermo-bonded products.
Unconventional methods for making carpets – Bonding, knitted carpet, stitch bonding, flocking.

VII) Towels: - Types of towels, Bath robes, Beech Towels, Kitchen Towels, Terry towels, Napkins - Construction, weave, pile height, patterning, production, dyeing, finishing, etc.

VIII) Velour - Types of velvets – Jacquard, Dobby, Plain, Printed – Manufacture & construction. Methods of velour making by cutting and shearing.

IX) Kitchen Textiles:-Aprons, Dish cloth, Teacosy, Bread bag, Mittens, Pot Holders, Table Mats – Construction & manufacturing details.

X) Performance specifications of different home textiles: - Importance, requirements of the US market, UK Market, Canada market.

XI) Evaluation of Home Textiles: - Introduction, Test Method for towels, rug and Home textiles

XIII) Finishes used in home textiles: - Introduction, protection against unpleasant adour, temperature regulated beddings, Antimicrobial finish, Moisture management finish, Towel finishing, Nanotechnology based home textiles enhancements.

Reference Books

1. Textile Floor coverings by G.H. Crawshaw, Textile Progress, Vol.9, No.2, The Textile Inst. Publisher.
2. Interior Furnishings', Textile Progress, Vol.11, No.1, By Mortimer O.Shea, The Textile Inst. Publication
3. Performance of Home Textiles, Subrata Das, Woodhead Publications India Pvt Ltd.
4. Carpets: Back to Front, Textile Progress, Vol.19, No.3 by – L Cegielka MA, The Textile Inst. Publication

FINAL YEAR B. TEXT - SEMESTER-II

8.5 NON-WOVENS & GEO-TEXTILES (TT/MMTT) (ELECTIVE-II)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

I) Historical background of nonwovens, non woven definition, stages in Non woven manufacturing

II) Web Forming Techniques: carding, Garnetting, air laid, wet process, polymer extrusion.

III) **Classification of nonwoven** – On the basis of use, on the basis of manufacturing process, on the basis of web formation, on the basis of bonding.

IV) **Dry laid webs** – fibre selection, fibre preparation, web formation, layering, Wet laid nonwoven – Raw materials, production process, special features of the wet laid process and its product. Spun laced webs

V) **Mechanically bonded webs** – needle punched nonwovens, Application of needle punching, stitch bonded nonwovens, applications.

VI) **Hydro entangled nonwovens** – Bonding process, water system, filtration system, web drying, properties of spun laced webs, applications.

VII) **Chemically bonded nonwoven** – Latex binder, other types of nonwoven binders, formulation, order of formulation, bonding technology – saturation, foam bonding, spray bonding, print bonding, powder bonding, application of chemical bonded nonwovens.

VIII) **Thermally bonded nonwovens** – binder, binding fibres, binding powder, binding webs, methods of thermal bonding – Hot calendaring, belt calendaring, oven bonding, ultrasonic bonding, radiant heat bonding.

IX) Melt blown nonwovens

X) Overview of geo textiles, types of geo textile, development of Geo textiles, functions of Geo textiles.

XI) Raw materials used fibre properties for geo textiles, production of Geo textiles. Such as wovens, non-wovens, knitted, grids, mats, ties, cellular Geo

textiles, webs, stripes, bio degradable geo textiles, and their properties for different functions and test methods.

XII) Types of soils, their characteristics, testing of soil.

XIII) Filtration and erosion control application. Principles, Erosion control for inland waterways, coastal erosion protection, scour protection, rain fall erosion control.

XIV) Drainage application: structural drainage, fin drains, land drainage etc.

XV) Separation application: Unpaved Road, Paved road, Railways.

XVI) Soil Reinforcement application. Steep faced embankment, slope stabilization, Retaining walls, Geo Textiles pile capping.

XVII) Growth of Geo textiles, potential of geo textiles in India.

XVIII) Durability and creep: Soil induced degradation, chemical pollution, Temperature resistance, sunlight degradation, stress relaxation.

Reference Books

1. Nonwoven Process Performance & Testing – Turbak
2. Nonwoven Fabric Construction Synthetic Fibres – Jan-Mar 2007.
3. Proceedings of the Seminar - Nonwoven Technology Market & Product Potential, IIT, New Delhi December 2006.
4. Geo Textile by NWM John.
5. Geo synthetics world by J. N. Mandal.
6. Designing with Geo synthetics by R. M. Koerner.
7. Periodicals on Non Woven & Geo Textiles.
8. Geotextiles by Dr P.K.Banerjee (IIT,New Delhi private circulation).
9. Geotextiles by BTRA (Private circulation)

FINAL YEAR B. TEXT - SEMESTER-II

8.5 MAINTENANCE MANAGEMENT IN TEXTILE (TT/MMTT) (ELECTIVE-II)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

I) Management - Basic concept of maintenance management, its role in profitability of company, planned maintenance and breakdown maintenance & economic aspects-sub classes of planned maintenance, Mechanism of planned maintenance, optimum planned maintenance, Computer applications in maintenance management.

II) Maintenance of spinning preparatory machines, schedules, precautions & methods to be followed during maintenance activities, tools & gauges used for maintenance.

III) Maintenance of Ringframe & Rotor Spinning Machine - schedules, staff, precautions & methods to be followed, Tools & gauges used. Study of aprons & cots used in spinning & their maintenance

IV) Machine audit – concept and auditing of spinning machines. Energy conservation in spinning

V) SQC synchronization with maintenance – SQC activities useful for maintenance in various departments of spinning.

VI) Basic concept of lubrication, types of lubricants used for textile machines, Lubricant storage, handling, and precautions. Essential properties of lubricants for various frictional behaviour.

VII) Maintenance of weaving preparatory machines, schedules, critical points of maintenance, precautions to be taken during maintenance operations.

VIII) Maintenance of plain & auto loom - Schedules, critical points, precautions, auditing of plain & auto loom.

IX) Maintenance of shuttleless weaving machines. Approach towards maintenance of latest weaving machines, Critical maintenance points of various shuttleless weaving machines.

X) Recording of maintenance activities & its importance.

XI) Concept of on line lubrication and cleaning.

Reference Books

1. Maintenance manuals by BTRA for various spinning & weaving machines.
2. BTRA monograph series.
3. Spinning machinery maintenance by SITRA
4. Maintenance manuals of different machinery manufacturers of spinning & weaving machines.

FINAL YEAR B. TEXT - SEMESTER-II

8.5 ORGANIZATIONAL BEHAVIOUR AND HUMANITIES (TT/MMTT/TPE/TC) (ELECTIVE-II)

Lectures : 3 Hrs / Week
Theory Paper: 100 Marks
Subject Total : 100 Marks

I) Fundamentals of Organizational Behaviour

The dynamics of people organizations –Managing communications – Social systems and organizational culture – Political institution – Society and the state.

II) Motivation and Reward Systems

Motivation – Appraising and rewording performance.

III) Leadership and Empowerment

Leadership – Empowerment and participation.

IV) Individual and Interpersonal Behaviour

Employee attitudes and their effects – Issues between organizations and individuals – Interpersonal behavior

V) Group Behaviour

Informal & formal groups – Teams and team building

VI) Change and its Effects

Managing change – Stress and counseling

VII) Emerging Aspects of Organizational Behaviour

Organizational behavior across cultures

VIII) Business & Environment-

Meaning of business, Changing concept and objectives of business – Business ethics – Importance of ethics – Need for business to be ethical – Ethical problems in business – How to make business ethical – Social responsibility of business – Meaning of environment – Business firm and its

environment – Constituents of business environment – Suppliers – Customers –Competitors – Public – Marketing intermediaries – Economic environment – Technological environment – Political environment – Social environment – Legal environment

X) Union and Industrial Labour Relations

Introduction – Trade unions – Industrial disputes – Strikes – Lock out – Picketing – Gherao – Settlement of industrial disputes – Collective bargaining – Handling of worker's grievances and grievance procedure – Worker's participation in management – Union management relations.

XI) Industrial Labour Legislation

Introduction – Importance and necessity of Labour Acts – Principles of Labour Legislation – Types of Labour Laws – Introduction, Importance and Necessity of :-

a. The Factories Act 1948
b. The Payment of Wages Act 1936
c. The Minimum Wages Act 1948
d. The Workmen's Compensation Act 1923
e. The industrial Dispute Act 1947
f. The Employee's State Insurance Act 1948

Reference Books

1. Organizational Behaviour – Human Behaviour at Work by J. W. Newstrom & Keitn Davis – Tata Mcgraw – Hill Publishing Company Limited – New Delhi.
2. Industrial Engineering and Management by O. P. Khanna & A. Surup – Dhanpat Rai Publications (P) Ltd., New Delhi
3. Industrial Organization and Engineering Economics by S. C. Sharma and T. R. Banga – Khanna Publishers – New Delhi 110 006
4. Strategic Management and Business Policy by T. L. Wheelen and J. D. Hunger Addison Wesley, of Addison Wesley Longmen
5. Managing Recruitment Training and Development by Elizabeth M Christopher and Larry E. Smith – Viva Books Pvt. Ltd., - New Delhi – Madras.

6. Target Setting and Goal Achievement – A practical guide for managers by Richard Hale and Peter Whitlam – Kogan Page India Pvt Ltd., 4325/3, Ansari Road, Daryaganj, New Delhi 110 002
7. Basic Managerial Skill for All by E. H. Mcgrath, S. J. Prentice – Hall of India – New Delhi
8. How to Manage Organizational Change – The Sunday times – by D. E. Hussey Kogan page India Pvt. Ltd., - Daryaganj, New Delhi – 100 002
9. Performance Appraisals – A critical view edited by Sumati Reddy – The ICFAI University press, 52, Nagarjuna Hills, Punjagatta, Hyderabad, India 500 082
10. Management in New Age – Western windows eastern Doors by Subhash Sharma New age International (P) Ltd., Publishers – New Delhi, Bangalore etc.

FINAL YEAR B. TEXT - SEMESTER-II

8.6 SEMINAR-II (TT/MMTT/TPE/TC/FT)

Lectures	:	2 Hrs / Week
Term Work	:	50 Marks
Subject Total	:	50 Marks

Topic -

In the beginning of the semester, every student of the class will be assigned a seminar topic in the emerging / perspective field in the area of textiles such as Spinning, Weaving, Fibres, Testing, Chemical processing and alike. Seminar should be based on the literature survey on any topic of textiles.

Seminar Preparation and Presentation –

Student will collect the information on the above subjects and submit the report on the dates specified by the concerned faculty. The seminar report will be of minimum 15 pages and maximum 25 pages. The spacing between the lines will be 1.5. The font size will be 13.5 point Times New Roman. The list of reference must be given at the end of seminar report. The list of reference should be written as per the Textile Research Journal format. The student has to present seminar in front of the faculty member of the department and his/her classmates. The faculty member, based on the quality of the work and preparation and understanding of the candidate, shall do an assessment of the seminar internally.

Term Work Marks –

Seminar Report	-	20 Marks
Presentation	-	30 Marks

FINAL YEAR B. TEXT - SEMESTER-II

8.7 DISSERTATION (TT/MMTT/TPE/TC/FT)

Practical	:	6 Hrs / Week
Term Work	:	50 Marks
Oral	:	100 Marks
Subject Total	:	150 Marks

Objective:-

To provide an opportunity to students to work on any topic / problem/ experiment selected by them and to encourage them to think independently. Students are assigned project work. Project work may be taken up by an individual or a group.

Topics: - Project work shall be based on any of the following topics.

i. Manufacturing of products, its testing and analysis.
ii. Fabrication of equipments / gadget.
iii. Extensive survey of industrial practices.
iv. A work on industrial problems and finding out remedial measures.
v. Experimental verification on principles used in textiles.
vi. Extensive numerical analysis of some problem may be carried out using computer.

Project Report:

Project report should be of 60 to 70 pages. For standardization of the project reports the following format should be strictly followed.

Project report contents:

i. Title Sheet
ii. Certificate
iii. Acknowledgement
iv. Index
v. Abstract
vi. Introduction
vii. Literature survey

viii. Plan of Work.
ix. Results and Discussion
x. conclusions
xi. References
xii. Annexures, etc if any.

The references should be given in the following standard format:
For Books:
"Authors", "Title of Book";; Publisher; Year of the Edition;

For Papers:
"Authors", "Title of Paper"; "Name of journal",; "Year", "Issue No," Page No".

Project report format:

i. Page size : Trimmed A4
ii. Left Margin – 1.5"
iii. Right Margin – 1"
iv. Top Margin – 1"
v. Bottom Margin – 1"
vi. Para Text : Arial 12 fonts
vii. Title:16 bold
viii. Sub title: 14 Bold
ix. Line Spacing : 1.5 Lines
x. Page Numbers: Right aligned at footer.
xi. The text should be justified.

Two hard bound copies of report should be submitted to the institute along with a soft copy in a C.D.

ASSESSMENT OF DISSERTATION WORK:-

Term work of 50 marks is assigned for dissertation work. A dissertation committee will observe the progress of the work by arranging two progress reviews and based on the performance the term work marks will be assigned.

ORAL EXAMINATION:-

One internal and one external examiner from industry / research organization / academia will be conducting oral examination.

FINAL YEAR B. TEXT - SEMESTER-II

8.2 PROCESS MANAGEMENT IN WEAVING (MMTT)

Lecture	:	4 Hrs / Week
Practical	:	2 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Practical Exam	:	50 Marks
Subject Total	:	200 Marks

1) Introduction to process management:

Object, scope and approach to achieve quality and productivity in fabric production, and Methodology adopted for the same (SQC, Direct Approach, and online monitoring)

2) Quality and production management in winding:

- Control of yarn joints quality on Automatic Winding machines for various materials – knots and splice (characteristics of good splice, appearance and strength ratings, splice testing, and adjustment of parameters),
- Yarn clearing: Yarn defects, Classimat classification, condition of clearers and its maintenance, assessment of performance of winding machine (knot factor, clearing efficiency).
- Unwinding and winding tension, relation with type of material and speed, use of auto tense, auto speed
- Package quality: Causes and Remedies of package defects:
- Material handling and work practices for optimum production and quality
- Management information system applicable to winding.

3) Process management in warping:

- Characteristics of perfect beam and monitoring the beam quality (flange condition, yarn continuity, beam density, yarn content, yarn tension, stop motion, drum, guides).
- Machine parameters adjustment and machine condition maintenance for minimizing end breaks for various materials and counts.
- Method of assessing productivity of warping machine & measures to improve the productivity.

- Material handling and work practices to optimize production and quality.
- Management information system.

4) Process management in sizing:

- Deciding the size recipe according to material and count of yarn, Preparation of quality size pastes w.r.t. concentration, viscosity and other properties.
- Determination and achieving the correct size pick up by controlling various sizing conditions, Modern pick up control equipment.
- Stretch and moisture level control on multicylinder sizing machine.
- Characteristics of perfect sized beam and its achievement (sticky, cross, broken and missing ends, defective selvedge).
- Method to increase weavability (wet splitting, after waxing, dry steaming etc.)
- Minimizing the size losses at every stage.
- Control of productivity.
- Material handling and work practices to get optimum production and best-sized beams.
- Management information system.

5) Process management in pirn winding:

- Minimizing end break and stoppages due to mechanical failures.
- Improvement of bobbin build.
- Control of productivity.

6) Process Management in drawing - in and warp tying.

- Evaluation of quality in drawing - in and warp tying.
- Selection, storage use and reuse of healds, reeds and drop pins of Various types, (parameters of heald reed, drop-pins that affect weaving performance
- Precautions during drawing - in and warp tying process.
- Productivity, norms and control.

7) Hard waste Reduction in Weaving Department:

- Approach to the reduction of hard-waste
- Setting the standards of hard-waste

- Ways to reduce hard-waste of different types in winding, warping, sizing, Pirn winding, drawing and loom shed.
- Ways to reduce warp and weft related hard waste on shuttle less looms generated due to false selvedges.

8) Process management in weaving (loom shed) for Fabric quality

- Causes & remedies for yarn related faults: Weft bars, black ends, slub, and thick end, Double end.
- Causes and remedies for following fabric defects on ordinary and automatic looms & shuttle less looms. Warp streaks, Reedy, bad selvedges (curly, broken, wavy, rough) missing ends, floats, cracks, thick places and starting marks, Weft loops, snarls, stains, broken and double picks, Lashing-in, Smash, Weft slough, temple roll mark, Emery roll marks, box marks, gout, furrow appearance in terry pile, uneven fabric
- Causes and remedies for defects on shuttle less looms for projectile, Rapier & Air jet weaving machines.
- Manual and automatic fabric inspection methods, various point grading systems,

9) Process management in weaving for productivity:

- Maintaining of loom speed on various weaving machines, limitations on maximum speed from textile point of view, mechanical condition causing reduction in speed.
- Control of Technical, Human and organizational factors affecting loom shed efficiency. Assessment of loom performance after corrective actions
- Control of down time through SMED technique
- Use of snap study in controlling efficiency losses
- Management information system to control productivity

10) **Maintenance of machines in weaving**

- Basic prerequisites and factors affecting maintenance activity
- Importance of maintenance, types and objectives of maintenance activities,

- Concept of preventive maintenance (PM) comparison with breakdown maintenance
- Work activities in preventive maintenance: cleaning, lubrication, inspection (in detail)
- Steps in preventive maintenance scheme.
- Levels of preventive maintenance: distribution of short, medium and long trem maintenance activities
- Cost of preventive maintenance: elements of cost, direct & indirect costs.
- Benefits of preventive maintenance and limitations

11) Weaving of specialty yarns and fabric

Filament weaving, weaving with high twist and PC blend yarn, tyre cord, parachute cloth

12) Computers and information technology in textiles-overview

List of Experiments

1. To prepare beam on the sample warping / sizing machine
2. Optimization of clearer and splicer parameters for different yarn counts and operate the winding machines to observe the results
3. To determine the end breakage rate of warping machine and calculate warping efficiency with the sett details in the visiting unit.
4. Preparation of the jacquard design and to weave fault free fabric on loom with electronic jacquard
5. To determine the % loss of efficiency for probable reasons through snap study in the visiting weaving unit
6. Adjustment of torsion bar to change the picking force on sulzer weaving machine and find its effect on working of loom by operating the loom.
7. Changing the rapier stroke, weft tension for different fabric widths and find its effect on the working of the rapiers and loom by operating the Rigid and Flexible rapier looms
8. Working of air jet machine with different air pressure combinations, blast timings and blast durations

9. To find cost per meter for the given woven and knitted fabric considering all elements of the cost in the small scale manufacturing units
10. Fabric Analysis 2 samples
11. Fabric Analysis 2 samples
12. Fabric Analysis 2 samples

Reference Books

1. Process Control in Weaving by M.C. Paliwal & P.D. Kimothi
2. Weaving: Technology and Operations by Allan Ormerod.
3. Weaving Machine, Mechanisms, Management by Dr. Talukdar, Ajagaonkar, Sriramulu.
4. ATIRA, BTRA Publications for Norms on Winding, Warping, Drawing in Looms.
5. Machine Manuals of Various Shuttle less Looms and – Preparatory Machines.
6. Preventive Maintenance of Plain and Auto Loom – By BTRA.
7. Manual of shuttle less Weaving: PSG College Publication.
8. Shuttle less Weaving: NCUTE Publication.

FINAL YEAR B. TEXT - SEMESTER-II

8.1 FLUID FLOW SYSTEMS & CONTROLS (TPE)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Oral Exam	:	50 Marks
Subject Total	:	200 Marks

I) Introduction to hydraulic and pneumatic systems, Areas of applications, relative merits and demerits, comparison of above systems with electrical, mechanical and hybrid systems.

II) ISO / JIC symbols used in pneumatics and Hydraulics and properties of compressed air for pneumatic systems, advantages of compressed air.

III) Fluid conditioning elements – filter, lubricator, dryers, heat exchangers, pressure regulators and strainers used in hydraulics and pneumatics.

IV) Study of control valves in pneumatics and hydraulics – A) Pressure control, B) Direction control C) flow control valves D) special valves.

V) Air compressors – Reciprocating compressor and Numerical treatment.

VI) Study of actuators – Linear and rotary actuators in pneumatics and hydraulics.

VII) Pneumatic circuits and applications – Basic Pneumatic Circuits - Speed control, sequencing, time delay, actuation of pneumatic motor.

VIII) Maintenance and trouble shooting in pneumatic and hydraulic system

IX) Hydraulic Systems – Introduction in brief, properties of fluid, types and selection of fluids.

X) Study of pumps used in hydraulic system and hydraulic power pack.

XI) Hydraulic circuits and applications – Basic hydraulic circuit - Speed control, sequencing, counter balancing, study of systems in Textile machines.

XII) Pipes and Fitting , accumulator, Pressure intensifiers.

List of Experiments

1. Study of direction control valves.
2. Study of meter – in flow circuit.

3. Study of meter – out flow circuit.
4. Operation of DAC – Unidirectional Control.
5. Operation of DAC – Bidirectional Control.
6. Study of circuits using sequence valve & time delay valve.
7. Study of pneumatic circuits on Textile Machines.

Reference Books

1. Pneumatics and Hydraulics – Harry L. Stewart.
2. Hydraulics & Pneumatics – Andrew Parr.
3. Pneumatic systems (Principles & Maintenance) – S. R. Majumdar.
4. Oil Hydraulics – S. R. Majumdar.
5. Industrial Hydraulics – John Pippenger & Tyler Hicks.

FINAL YEAR B. TEXT - SEMESTER-II

8.2 INSTRUMENTATION & METROLOGY (TPE)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Practical Exam	:	50 Marks
Subject Total	:	200 Marks

I) Measurement:-

Introduction, Need of measurement, Methods of Measurement, International standards of Measurement - a) Line standards b) End standards c) Wavelength standards, System of measurement. Accuracy & precision of measurement

II) Study of Instruments:-

Vernier Calliper, Micrometer, Height gauge, Depth gauge, Slip gauges, Grades of Slip gauges, application, Universal measuring machine.

III) Measurement of Angle: -

Measurement of angle by using instruments like Bevel protractors, Clinometer, Angle dekkor. Angle gauges, Auto collimator, case studies of measurement of an unknown angle by using Sine bar, Standard balls & Rollers etc.

IV) Surface Finish: -

Roughness, Wavyness, lay, methods of measuring roughness, Ra value, RMS value, CLA value, Ten point height method, Instrument for measuring surface Texture, Profilometer

V) Straightness & Flatness: -

Inspection of straightness & Flatness by using instruments straight edge, spirit level, Auto-collimator, Beam comparator, Tests to check squareness, parallelism of the axes.

VI) Interferometry: -

Principles, optical flat, Typical applications of optical flat.

VII) Measurement of External Threads: -

Thread geometry, different errors in screw threads, measurement of form of thread with profile projector, pitch measurement, measurement of thread diameter with standard wires. Screw thread micrometer.

VIII) Comparators :-

Study of Mechanical, Electrical, Electronic, Pneumatic, Optical comparators

IX) Limit, Fits, Tolerances: -

Introduction to limit, fits, allowances, Tolerances, Unilateral, bilateral tolerances, Interchangeability, types of fits, Systems of fits, Introduction to limit gauges, GO-NOGO gauges. Taylor's Principle.

X) Study of Instruments and gauges used in spinning and weaving:-

Prism calliper, stroboscope, spring balance, tachometer, frame level, pressure gauge, saddle gauge, gauges useed in looms like Simco, Ruti-C, Airjet etc.

List of Experiments:-

Five experiments based on below refered areas in combination.

1. Study & use of various instruments.
2. Use of comparators.
3. Screw thread measurement.
4. Gear Inspection.
5. Use of optical profile projector.
6. Use of sine bar.
7. Use of optical flat.
8. Use of standard ball & roller for angle measurement.

Reference Books:-

1. Engineering Metrology – I.C. Gupta
2. Engineering Metrology – R.K. Jain
3. Practical Engineering Metrology – Sharp K.W.B. Pitman, London.

FINAL YEAR B. TEXT - SEMESTER-II

8.4 MAINTENANCE MANAGEMENT (TPE)

Lectures	:	4 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

I) Basic concept of maintenance management its role in profitability of company, planned maintenance and breakdown maintenance & economic aspects, subclasses of planned maintenance, Mechanism of planned maintenance optimum planned maintenance, Computer applications in maintenance management.

II) **Condition based maintenance** – Importance, subjective & objective inspections, types of condition monitoring techniques, Detailed study of (NDT) non-destructive testings, performance evaluation, debris analysis, dynamic analysis.

III) **Performance Evaluation of maintenance function** – Control – Methods of control and use of various indices.

IV) **Failure Analysis** – Classification of failures, method of failure analysis, use of trouble shooting charts & other techniques.

V) Planning, scheduling, maintenance organization, performance evaluation of maintenance function, PERT, CPM and other techniques for planning.

VI) **Value Analysis & value Engineering** – concept and techniques of value analysis & value engineering

VII) **Lubrication management** – Importance, measures for economy in lubrication management.

VIII) **Spare parts management** – Importance & means of inventory control.

IX) **Maintenance budgeting** – Methods of budgeting, selective budgeting control, techno economics of maintenance.

X) **Equipment Replacement** – Need for replacement, Selection of appropriate alternative of replacement.

Reference Books

1. Maintenance Management volumes 1 to 20, by IMME Delhi

FINAL YEAR B. TEXT - SEMESTER-II

8.5 CONDITION BASED MONITORING TECHNIQUES (TPE) (ELECTIVE-II)

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

I) **Introduction to Condition Monitoring** - Subjective & objective assessment, advantages of condition based maintenance over preventive maintenance. Types of inspections in condition based maintenance.

II) **Non Destructive Testings** - Ultrasonic testing, Radiography, Thermography, eddy current testing, Magnetic particle test, Acoustic, emission testing, Temperature measurement, stroboscope, optical inspection techniques.

III) **Special Purpose Inspection Methods** - Crack detection, leak detection, corrosion monitoring, Contaminant examination – magnetic plug test, SOAP, Particle count method.

IV) **Performance Monitoring** - Concept, On line monitoring techniques in Textile machine – Ring data system, Varioset, Classimat, Autolevellers at carding and drawframe, Uster spectrogram.

V) **Dynamic Analysis** - Fundamentals of vibration & noise. Concept of Dynamic analysis, vibration measurement methods, applications. Case study of shock pulse monitoring of antifriction bearing, Machinery noise & analysis.

VI) **Lubrication Monitoring** - Objects, Methods, Laboratory tests & spot tests for oils & greases.

VII) **Study of transducers used for vibration and noise measurement** – LVDT - Peizo crystal – inductive - condenser mic - peizo mic - electrets microphone, etc.

VIII) **Methods of vibration and noise isolation** - Fundamentals related to vibration and isolation of noise, free damped vibrations, vibrations with 6 degrees of freedom. Transmissibility, damping factor. Materials and methods used for isolation of noise.

Reference Books

1. Maintenance Management Vol. 12, IMME Pub.
2. Summer School on Maintenance Engineering – S.J.C.E. Mysore.
3. Measurement System – E.O. Doeblin, McGrawhill International Pub.
4. Theory & application of Digital Signal Processing – Ranbiner L.R. & Gold B.
5. Mechanical Measurements – Beckwith T.G. and Lewis Buck N.
6. Machinery Noise Measurement – S.J. Yang and A.J. Ellison, Oxford New York.

FINAL YEAR B. TEXT - SEMESTER-II

8.5 PROCESS CONTROL IN WEAVING (TPE) (ELECTIVE II)

Lecture	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

1) Introduction to process management:

Object, scope and approach to achieve quality and productivity in fabric production, and Methodology adopted for the same (SQC, Direct Approach, and online monitoring)

2) Quality and production management in winding:

- Control of yarn joints quality on Automatic Winding machines for various materials – knots and splice (characteristics of good splice, appearance and strength ratings, splice testing, and adjustment of parameters),
- Yarn clearing: Yarn defects, Classimat classification, condition of clearers and its maintenance, assessment of performance of winding machine (knot factor, clearing efficiency).
- Unwinding and winding tension, relation with type of material and speed, use of auto tense, auto speed
- Package quality: Causes and Remedies of package defects:
- Material handling and work practices for optimum production and quality
- Management information system applicable to winding.

3) Process management in warping:

- Characteristics of perfect beam and monitoring the beam quality (flange condition, yarn continuity, beam density, yarn content, yarn tension, stop motion, drum, guides).
- Machine parameters adjustment and machine condition maintenance for minimizing end breaks for various materials and counts.
- Method of assessing productivity of warping machine & measures to improve the productivity.
- Material handling and work practices to optimize production and quality.

- Management information system.

4) Process management in sizing:

- Deciding the size recipe according to material and count of yarn, Preparation of quality size pastes w.r.t. concentration, viscosity and other properties.
- Determination and achieving the correct size pick up by controlling various sizing conditions, Modern pick up control equipment.
- Stretch and moisture level control on multicylinder sizing machine.
- Characteristics of perfect sized beam and its achievement (sticky, cross, broken and missing ends, defective selvedge).
- Method to increase weavability (wet splitting, after waxing, dry steaming etc.)
- Minimizing the size losses at every stage.
- Control of productivity.
- Material handling and work practices to get optimum production and best-sized beams.
- Management information system.

5) Process management in pirn winding:

- Minimizing end break and stoppages due to mechanical failures.
- Improvement of bobbin build.
- Control of productivity.

6) Process Management in drawing - in and warp tying.

- Evaluation of quality in drawing - in and warp tying.
- Selection, storage use and reuse of healds, reeds and drop pins of Various types, (parameters of heald reed, drop-pins that affect weaving performance
- Precautions during drawing - in and warp tying process.

7) Hard waste Reduction in Weaving Department:

- Approach to the reduction of hard-waste
- Setting the standards of hard-waste
- Ways to reduce hard-waste of different types in winding, warping, sizing, Pirn winding, drawing and loom shed.
- Ways to reduce warp and weft related hard waste on shuttle less looms generated due to false selvedges.

8) Process management in weaving (loom shed) for Fabric quality

- Causes & remedies for yarn related faults: Weft bars, black ends, slub, and thick end, Double end.
- Causes and remedies for following fabric defects on ordinary and automatic looms & shuttle less looms. Warp streaks, Reedy, bad selvedges (curly, broken, wavy, rough) missing ends, floats, cracks, thick places and starting marks, Weft loops, snarls, stains, broken and double picks, Lashing-in, Smash, Weft slough, temple roll mark, Emery roll marks, box marks, gout, furrow appearance in terry pile, uneven fabric
- Causes and remedies for defects on shuttle less looms for projectile, Rapier & Air jet weaving machines.
- Manual and automatic fabric inspection methods, various point grading systems,

9) Process management in weaving for productivity:

- Maintaining of loom speed on various weaving machines, limitations on maximum speed from textile point of view, mechanical condition causing reduction in speed.
- Control of Technical, Human and organizational factors affecting loom shed efficiency. Assessment of loom performance after corrective actions
- Control of down time through SMED technique
- Use of snap study in controlling efficiency losses
- Management information system to control productivity

10) Maintenance of machines in weaving

- Basic prerequisites and factors affecting maintenance activity
- Importance of maintenance, types and objectives of maintenance activities,
- Concept of preventive maintenance (PM) comparison with breakdown maintenance
- Work activities in preventive maintenance: cleaning, lubrication, inspection (in detail)
- Steps in preventive maintenance scheme.

- Levels of preventive maintenance: distribution of short, medium and long trem maintenance activities
- Cost of preventive maintenance: elements of cost, direct & indirect costs.
- Benefits of preventive maintenance and limitations

Reference Books

1. Process Control in Weaving by M.C. Paliwal & P.D. Kimothi
2. Weaving: Technology and Operations by Allan Ormerod.
3. Weaving Machine, Mechanisms, Management by Dr. Talukdar, Ajagaonkar, Sriramulu.
4. ATIRA, BTRA Publications for Norms on Winding, Warping, Drawing in Looms.
5. Machine Manuals of Various Shuttle less Looms and – Preparatory Machines.
6. Preventive Maintenance of Plain and Auto Loom – By BTRA.
7. Manual of shuttle less Weaving: PSG College Publication.
8. Shuttle less Weaving: NCUTE Publication.

FINAL YEAR B. TEXT - SEMESTER-II

8.5 INDUSTRIAL TEXTILES (TPE) (ELECTIVE-II)

Lectures : 3 Hrs / Week

Theory Paper: 100 Marks

Subject Total : 100 Marks

I) Introduction to Industrial Textiles - Definition, Textile materials in technical applications Fibres – Natural & man made fibres suitable for technical applications & their relevant properties

II) Textiles for Filtration - Introduction, Principles and some mathematical models of wet & dry filtrations. Dust Filtration, High Temperature filtration, Purification & Separation of Gases, Cigarette Filtras, Liquid Filtration. Solid liquid - filtration, liquid – liquid filtration, Application of ion-exchange materials in the purification of Industrial effluents, the application of hollow filters in filtration by Reverse osmosis.

III) Medical Textiles - Textiles in various medical applications, absorbency of textile materials & methods of sterilization, application oriented designing of typical medical textile (e.g. porous graft or a transient tube) e.g. Heat value replacement by textile prosthesis. Materials used and design procedures for protecting wound, cardiovascular application, submerses etc.

IV) Flexible Composites - Typical production methods of tyres, belts & hoses. Interactions of raw material & structure with functional properties, advances in design. The role of textiles in pneumatic tyres.

V) Rigid Composites - Three dimensional fabrics & triaxially braided materials for composites.

VI) Ropes, Twines, Sewing Threads & Cordages - Methods of production & application oriented structure & ropes, cordages & twines. Properties & applications.

VII) Protective Clothing - Thermal protection, Ballistic protection, Protection from electro – magnetic radiation & static hazards. Protection against micro-organism, chemicals & pesticides. Accident simulation test. 96

VIII) Geo Textiles - Soil characteristics. Mechanism of reinforcement, filtration & drainage of soils by geo textiles. Typical applications. Determination of relation between soil particle size & pore size distribution for hydraulic applications. Methods of long terms prediction of survivability of geo textiles in soil.

IX) Coated Fabrics - Introduction, Coated fabrics in Civil Engg., Inflatable structures, coated fabrics for the disposal & reuse, coated Textiles in Agriculture, Tarpaulin & covers seats.

X) Miscellaneous Industrial Uses - Textile materials in footwear, defence, transport, agriculture & marine applications Papermakers felt, Civil Engg., Synthetic Turf & sport surfaces. Bearing of Sealing Materials, Sound Insulation, Thread Insulation, Battery Separations, Electrical Insulation, Structural Application, Fishing Industry, Parachute textiles, Falt & V Belt.

Reference Books:

1. Electrostatic Charging of Textiles Textile Progress Vol.28, No.1 BY I. Holme, The Textile Institute Publication.
2. High Performance Fibres Textile Progress, Vol.25, No.3/4, By S.K. Mukhopadhyay, Textile Institute Publication.
3. Medical Textiles 96, Conference Proceeding, by Bolton UK, Woodhead Publication Ltd.,
4. The Production & Properties of Narrow Fabrics Textile Progress, Vol.8, No.4, By – J.P. Turner, The Textile Institute Publication.
5. Protective Clothing Textile Progress, Vol.22, No.2/3/4, By P.W. Harrison, The Textile Institute Publication.
6. Needle Punching by A.T. Purdy The Textile Institute Publication.
7. Barrier Fabrics for Protection Against Aerosols' The Textile Progress, Vol. 26, No.1,By S.M. Maini, The Textile Inst. Publication.
8. Automotive Textiles, Textile Progress, Vol.29, No.1/2 by S.K. Mukhopadhyay & J.F. artridge, The Textile Inst. Publication.
9. The Thermal Insulation Properties of Fabrics Textile Progress, Vol.24, No.4, J.O. kponmwan, The Textile Inst. Publication.
10. Thermal Bonding of Non woven fabrics Textile Progress, Vol.26, No.2, The Textile Inst. Publication 97

11. Industrial Application of Textile : Textiles for Filtration and Coated fabrics Textile Progress, Vol.14, No.1, By Pushpa Bajaj & A.K. Sengupta, The Textile Inst. Publication.
12. Developments in Non-woven fabrics Textile Progress Vol.12by A.T. Purdy, Textile Institute Publication.
13. Journal of The Textile Institute Vol.81, No.4 By P.W. Harrison, The Textile Inst. Publication
14. Tiwc96 Niches in the world of Textile Vol, World Conference by TTI, The textile institute publication.
15. Industrial Application of Textiles by K.L. Floyd, Textile Progress Vol.6 No.2 The Textile Institute Publication.
16. Medical Textile – International Conference, Bolton UK. 17) Handbook of Technical Textiles Edited by A.R. Horrocks and S.C. Anand Published by Woodhead Pub. Ltd., Cambridge, England.

FINAL YEAR B.TEXT. - SEMESTER- II

8.1 GARMENT PROCESSING (TC)

Lectures	:	3 Hrs/ Week
Practical	:	3 Hrs/ Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Practical Exam	:	50 Marks
Subject total	:	200 Marks

1 **Introduction**

Introduction to Garment processing - Importance of garment processing- Advantages and limitations of garment processing – Characteristics of various fibers used in garment manufacturing with respect to garment processing. Major issues in Garment processing

2 **Garment Dyeing**

Concepts of garment stage and pre garment stage dyeing- General precautions for garment dyeing – flow chart for garment dyeing - Various machinery used for Garment dyeing like paddle dyeing machine, drum dyeing machine

Drying of garment dyed goods – Various drying machinery like Hydroextractor, Tumble dryer, RF dryer,

Problems in Garment dyeing and its remedies.

3 **Garment Printing**

Special print recipes for garments – Khadi – Metallic – Flock – Plastizol – Reflective – Pearl – Fluorescent – High density printing – Puff Printing – Foil Printing – Plastic Printing – Printing of Garments with Photochromatic and Thermo chromatic dyes –

Garment Printing Machinery

Table printing- Multi arm flat bed printing machine for Garments, Digital printing, Transfer printing

4 **Garment Finishing**

Classification – Flow chart

Fragrance finish – UV protection finish - Cool finish - thermo cat finish – water resistant

breathable finishes

Functional Finishes

Wrinkle free – durable press– - Feather touch finish – Rubbery touch finish – Stain Resistant Teflon finish - Moisture management finish

Bio Polishing - Introduction – Mechanism involved – problems and it's remedies

5 **Garment Washing**

Introduction – Various wash down effect - Flow chart – Stone washing – Various stone less stone washing effects like enzyme wash, Mud wash, Ion wash, Chalk wash and Monkey wash.

Other novel wash down effects like Acid wash, Antique wash, Denim Hand Sand / Scraping- Sand Blasting – Ball Blasting - Whiskering – Ozone Fading – Back Staining- It's causes and remedies

6 **Laundering**

Objective – Laundering procedure for garments made up of various fibers like cotton, linen, wool, silk and manmade textiles – various laundering equipments

7 **Stain Removal**

Objectives – with reference to garment processing – Identification of stains- classification of stains – classification of stain removers – principle of stain removal- application technique of stain removal – local application and bulk application.

8 **Dry Cleaning**

Introduction – objectives and principle of dry cleaning process – dry cleaning chemicals with special reference to the banned dry cleaning agents – Detailed dry cleaning process for cotton garments.

List of Experiments

1. To identify various types of stains and their removal
2. Printing of garment with plastizol and khadi prints
3. Printing of garment with pearl and metallic prints
4. Soil release finish on garments
5. Water repellent finish on garments

6. Stoneless stone wash effects
7. Fragrance finish on garments
8. Stone washing of denim garments
9. Enzyme wash of denim garments
10. Acid wash of garments
11. Ion wash of garments

References Books:

1. Dinkar Mahajan- Know All About Denim- Mahajan Publishers Private Limited, Ahmadabad.
2. Chemical Finishing of textiles by W D Schindler and P J Hauser
3. Textile finishing by Derek Heywood
4. Chemical after treatments of textiles by mark, atlas & wooding
5. Textile Finishing by A J Hall
6. Etters J.N., “Influence of Fabric Surface Effects on Colour Depth and Hue of Garment Dyed Textiles”, American Dyestuff Reporter, 1997 (5) 15 – 18
7. Murphy J.M., “Improving Preparation Techniques for Garment Dyeing”, American Dyestuff Reporter, 1987, 41 – 48, 50

FINAL YEAR B.TEXT. - SEMESTER- II

8.2 PROCESSING OF YARN AND SPECIELITY FABRICS (TC)

Lectures	:	4 Hrs/Week
Practical	:	3 Hrs/Week
Theory Paper	:	100 Marks
Term Work	:	50 Marks
Practical Exam	:	50 Marks
Subject total	:	200 Marks

I) **Processing of knit goods -** Concept of warp knits, weft knits, courses, wales, stitch and loop density. Factors to be considered in knit processing, process sequences in tubular and open width form. Pretreatment like singeing, scouring, bleaching and mercerization. Dyeing with direct, reactive, vat and sulphur using winch and soft flow dyeing machines. Chemical and mechanical finishing. Shearing, raising, drying and compacting. Faults in knit goods.

II) **Processing of Denim -** Introduction to denim, types of Denim fabrics, chemistry and process of warp dyeing with indigo. Indigo dyeing equipments. Dyeing with mixture of indigo and other dyes. Finishing of Denim Fabrics and Garments. Quality and process control in wet processing.

III) **Terry towel -** Process sequence and machines used for terry towel manufacturing, essential properties of terry towel fabrics like pile properties, water absorbancy. Type and application of terry fabrics. Different stages of towel processing and finishing. Defects in terry fabrics.

IV) **Carpet Processing -** Different fibres suitable for carpets, types of carpets, essential properties of carpet fabric. Dyeing and printing of carpets. Mechanical and chemical finishing of carpets.

V) **Processing of Lyocell -** General properties and uses of lyocell (Tencel). Pretreatment, dyeing and finishing of lyocell. Concept of fibrillisation, its causes and remedies.

VI) **Processing of Fabric containing spandex -** Brief introduction of properties and uses of spandex fibres and blends. Wet processing of Cotton / Spandex, Viscose / Spandex, Nylon / Spandex, polyester / Spandex fabrics. Finishing of warp knits containing spandex fibres.

VII) **Processing of Modified Polyester-**

Processing of modified polyester like Micro-denier polyester, CDPET, Easy dyeable polyester, Texturised Polyester, silk like polyester, processing of 3GT and PBT.

VIII) **Silk -** Morphological and chemical structure of silk. Degumming and bleaching of silk. Dyeing and printing of silk. Mechanical and chemical finishing of silk.

IX) **Wool -** Morphology and chemical structure of wool, introduction to woolen and worsted systems. Pretreatments like scouring, bleaching and carbonization of wool. Mechanism and process of wool setting. Dyeing of wool and its blends like wool/cotton, wool/silk, wool/polyester and wool/acrylic. Mechanical and chemical finishing of wool.

X) **Jute and linen -** General properties and uses of jute and linen fibres. Their pretreatment and dyeing processes. Woollenisaion of jute.

List of Experiments -

1. Dyeing of Cotton knitted fabric with reactive, vat and sulphur dyes
2. Measurement of spirality and residual shrinkage of knitted fabric
3. Dyeing of cotton with Indigo dye
4. Dyeing of cotton yarn with indigo in combination with other dyes
5. Imparting fading effect on indigo dyed fabric by mechanical and chemical means
6. Dyeing of linen with water soluble dyes
7. Processing of cotton / spandex blend fabric
8. Heat and steam setting of fabric containing spandex in blends and evaluation of stretch recovery
9. Bleaching and softening of Jute fabric
10. Woollenisation of jute fabric
11. Dyeing of Jute with acid, basic and reactive dyes
12. Dyeing of Jute and Linen with natural dyes
13. Dyeing of Wool in blends with other fibres to produce safari shades
14. Dyeing of wool / acrylic blend

15. Dyeing of Silk in blends with other fibres
16. Stain removal of various textile materials
17. Demonstration: visit to either one or more industry to demonstrate processing of Denim, Knits, wool, silk, terry towel or carpet.

Reference Books-

1. Processing of cotton knitted fabrics by M. Chakraborty, Amit Dayal and Prof. M. L. Gulrajani.
2. Denim a Fabric for All by dr. Parmar, NITRA
3. Manufacturing of Terry Towel by Subhash J. patil, Universal Book Corporation, Mumbai.
4. Interior Furnishing by Mortimer O'shea, Textile Progress, Vol. 11, No. 1, Textile Institute.
5. Textile Floorocovering by G. H. Crowshaw, Textile Progress, Vol. 9, No. 2, Textile Institute.
6. Carpet Surface by H. Pointon, Textile Trade Press, UK.
7. wool science and Technology by W. S. Simpsion, G. H. Crowshaw, Woodhead Publishing, Textile Institute.
8. Textile Printing by L.W.C. Miles, SDC Publication.
9. Theory and practice of Wool Dyeing by C. L. Bird.
10. Trouble shooting in Wet Processing: Acetate, Reyon / Lyocell and Spendex Blends, AATCC.
11. Handbook of Jute by T C Ranjan.
12. Silk dyeing, Printing and Finishing by Prof. M. L. Gulrajani.
13. Silk dyeing, Printing and Finishing by G. H. Harst.
14. Silk Dyeing and Finishing Handbook – Shanghai Municipalty Silk Industry Corporation, Chaina.
15. Wool Dyeing by Devid M. Lewis.

FINAL YEAR B. TEXT. SEMESTER - II

8.4 MANUFACTURE OF TECHNICAL TEXTILES (TC)

Lectures : 3 hrs /week

Theory Paper: 100 marks.

Sub. Total : 100 marks

1) **Polymeric Materials for Coating**: Rubber (natural and synthetic), polyvinyl chloride, polyurethane, Acrylic polymers, Adhesive treatment, Radiation cure coatings.

2) **Textile Substrates for Coated Fabrics**, materials and trends, Textile fibres, woven fabrics, knitted fabrics, Non,woven fabrics.

3) **Coating Techniques**, General features, knife coating, roll coating, Dip coating, transfer coating, Gravure coating, rotary screen coating, calendaring, Hot melt coating, scatter coating, laminating coating.

4) **Non Apparel Coating**, synthetic leather, architectural textiles, fluid containers, tarpaulins, automotive air bag fabrics, carpet backing, textile foam laminates for automotive interiors.

5) **Physical Properties of Coated Fabrics and Important Test Methods**
General properties, tensile strength, elongation, Adhesion, tear resistance, weathering behaviour, micro biological degradation, coating mass per unit area, Degree of fusion, Damage due to flexing, tests for colour fastness to dry and wet rubbing, low temperature bend test, low temperature impact test, Resistance to water penetration, Air permeability, resistance to permeation / penetration by hazardous liquid chemicals, electrical resistivity of fabric. Fabric finishing and coating, Dyeing, Printing and finishing

6) **Military and Defence Textiles:** Introduction, protective clothing, textiles used in defence systems and weapons, other applications.

7) **Medical Textiles**: Introduction, materials used in bio,textiles, classification of medical textiles, textiles for implantation, non,implantable textiles, textiles for extra corporeal (biomedical), Health care and hygiene products.

8) **Geotextiles:** Introduction, geotextile materials, geotextile properties, geotextile functions, application & examples of geotextiles, geosynthetics

9) **Filtration Textiles:** Introduction, Principles of filtration and equipments, textiles in dry filtration, textile in liquid filtration, finishing treatments, testing of filter fabric.

10) **Sports & Creation Textiles and Water Proof Breathable Fabrics:** Sports and creation textiles, Introduction sports uniforms, camping and hiking, base ball, tennis, foot ball, golf & hockey, bikes, marine products, textiles in sports surfaces, hot air ballooning. Water proof breathable fabrics, Introduction, types, assessment techniques and performance of water proof breathable fabrics.

11) **Safety Protective Textiles:** Introduction, high temp. textiles, flame resistant protective clothings, chemical, protective clothing's (CPC), Mechanical protection, electrical protective clothings, clean room textiles, radiation protection, thermal insulation, high visibility textiles metallized fabrics, space suits.

12) **Transportation Textiles :** Types, airbags, seat belts, automotive interior and exterior trim, truck and car covers, belts, hoses and filters in cars, textiles for aircrafts, textiles & structural elements in transport vehicles, Inflatable products used in transportation.

13) **Colouration and Finishing of Technical Textiles:** Introduction, object of colouration, colouration of technical textiles, dyestuffs and pigments, mass colouration, conventional dyeing and printing of technical textiles

14) **Smart Textiles:** Concept of phase change materials like temperature sensitive, pH Sensitive, photo sensitive etc., Applications of phase change materials in textiles. Concept of shape memory polymers and their applications in textiles. Use of electronics in clothings.

Reference Books

1. Hand book of technical textiles by A.R. Horrock and S.C. Anand
2. Coated textiles Principles and applications by Dr. A.K. Sen
3. Medical textiles ’96 by Subhash Anand
4. Automotive textiles by Dr. S.K. Mukhopadhyay and J.F. partridge, The Textile Institute.
5. Wellington sear’s hand book of Industrial textiles by Dr. Sabit Adanur.

FINAL YEAR B.TEXT- SEMESTER- II

8.5 TEXTILE EFFLUENT TREATMENTS (TC) (ELECTIVE II)

Lecturers: 3 Hrs/ Week

Theory Paper: 100 Marks

Subject total: 100 Marks

1 **Introduction to Eco system**

Definition - current Eco system problems - global warming – ozone layer depletion - ecology and textiles – carbon cycle, carbon foot prints – carbon trading – roll of IPCC – Kyoto Protocol,, Soil pollution, eutrofication, Risk assessment- risk management- concept of better Cotton, organic cotton, organic wool, organic silk.

2 **Pollution caused by pretreatments**

Effluent load in terms of BOD COD TDS and SS of various textiles pre treatments like Desizing, Scouring and Bleaching.

Advantages and disadvantages of enzymes in above processes. Comparison between various Enzymatic pretreatments with conventional pretreatments. Concept of organic stabilizer and peroxide killers, ecofriendly methods to improve whiteness index above 150.

3 **Pollution caused by Dyeing**

Effluent load in terms of BOD COD TDS and SS of during dyeing of cotton with reactive, vat and sulphur deys. Dyeing of sulphur and vat dye by eco friendly methods. Concepts of electrolytic reduction in Vat dyeing. Concepts of natural dyes, classification of natural dyes, classification of mordant's ,dyeing method with natural dyes Super critical carbon dioxide dyeing- Ultrasonic assisted wet processing.

4 **Pollution caused by Printing and finishing**

Eco-friendly Finishing & Printing – effluent load in printing and finishing in terms of BOD COD TDS and SS. Bio polishing, Eco-friendly resin finishing, , Eco-friendly printing with respect to thickeners and auxiliaries used in pigment printing, Eco-friendly textile specialty chemicals. . Plasma Technology; Preparation, Properties and application of plasma in finishing

5 **Introduction to Environmental Management**

Definitions of environment and pollution, Types of pollution and effects of various stages of textile processing on environment, general waste categorization, and effective pollution prevention programme, concept of 3R and 5"s" for housekeeping to reduce pollution. Concept of EPR to reduce pollution. Tool of TQM to reduce pollution .Testing of Effluents for various characteristics such as BOD, COD. Turbidity, TDS, SS, Grease, Oils. .

6 **Effluent Treatments**

Methods of Treatment of Textile effluents – primary treatment –Screening, sedimentation – Equalization, Coagulation, Secondary Treatment –Activated Sludge Process, Trickling Filtration, sludge disposal, Tertiary treatment – Multimedia Filtration and Reverse Osmosis Analysis of effluents – Reuse of water –cost of effluent treatment, design of typical ETP. , Concept of common effluent treatment plant.

7 **Noise Pollution & Air Pollution in Textile Industries**

Noise Pollution and its control in Textile Industry – Introduction, Noise in Textile Industry – Effect of noise on human beings – measurement of noise, definition of decibel for sound measurement. Sources of noise pollution in textile industry– methods of reducing noise & vibration.

Classification & properties of air pollutants, sources of emission, Green house gases, behavior and fate of air pollutant, effect of air pollution on human health, vegetation, animals, materials & structures, Plume behavior, , Control measures of gaseous pollutants and particulate matter, Analysis of air pollutants like sulphur dioxide and carbon monoxide

8 **Other health hazards in Textile Industry**

Toxicological considerations of textile processing. Fire & accidents Types of fires and types of fire extinguishers, reasons for fire and accidents in textile industry, Practices of Industrial safety in Textile mills. Diseases in Textile Industry-Its causes and remedies, occupational Health & safety management techniques, energy planning.

9 **Environmental Management System (ISO / 14000)**

Emergency of ISO - 14000 standard, environmental policy, EMS planning, concept of Ecolables,Okotex standards and GOTS

Reference Books:

1. Carbon footprints of a garment manufacturing unit, By M L Gulrajani, JTA Nov-Dec 2009.
2. Carbon footprints in textiles, JTA may-June 2011.
3. Economy Energy & Environment in textile Wet Processing – ACT, Edited by S.S. Trivedi.
4. Environmental Issues – Technology option for Textile Industry Edited by R. B. Chavan, Indian Journal of Fibre & Textile Research Special Issue - March, 2001.
5. Eco-friendly Textiles Challenges to Textile Industry – Textile Committee.
6. Environmental Success – America Textile Industry, AATCC Symposium – 1996.
7. The Textile Industry: Achieving Our Environmental Commitment – AATCC Symposium – 1994.
8. Textile Energy & Waste Seminar – Textile Institute, 1997.
9. The Management Systems – Quality, Environment, Health & Safety ISO 9001 : 2000, ISO 14001, OHSAS 18001 BY Pranab Kr. Nag, International Certification Services.
10. Water Supplies of the Treatment and Disposal of Effluents by A.H. Little, Textile
11. Institute Monograph series.
12. Handbook of Environments, health & safety by Herman Koren & Michael Biseri
13. Ecology and textiles by Dr. V.A. Shenai
14. Azo dyes – facts & figures by Dr. V.A. Shenai
15. Environmental issues – Technology options for textile industry – book of papers edited by Dr. R.B. Chavan.
16. Eco-friendly textiles, challenges to the textile industry – Book of papers by Textile Committee.
17. Guidance for the manufacture of eco-friendly textiles – Book of papers by Textile committee.
18. Eco-friendly textiles – book of papers edited by Prof. M.L. Gulrajani.
19. Dyeing & Printing with natural dyes – NCUTE workshop book IIT, Delhi.
20. Convention on natural dyes – Book of papers IIT- Delhi.

FINAL YEAR B. TEXT - SEMESTER-II

8.5 MERCHANDISING (TC) ELECTIVE II

Lectures	:	3 Hrs / Week
Theory Paper	:	100 Marks
Subject Total	:	100 Marks

I) **Organization of the Apparel Business -** Introduction to apparel industry - organization of the apparel industry, types of exporters Business concepts applied to the apparel industry

II) **Marketing -** Functional organization of an apparel firm. Responsibilities of a marketing division - marketing objectives and strategies - Marketing research - Types of markets: Retails and wholesale strategies for merchandise distribution- retailers - sourcing flows and practices. Marketing plan. Labeling and licensing.

III) **Merchandising -** Definition of merchandising - functions of merchandising division - Role and responsibilities of merchandiser, categories and process of apparel merchandizing, fashion accessories merchandizing, apparel export merchandizing, apparel retail merchandizing, different types of buyers - Communications with the buyers - awareness of current market trends – product development line planning line presentation.

IV) **Sourcing -** Need for sourcing - sourcing materials - manufacturing resources planning - principles of MRP – Overseas sourcing - sourcing strategies. Supply chain and demand chain analysis - Materials management for quick response - JIT technology.

V) **Documentation -** Order confirmation, various types of export documents, Pre-shipment Post -shipment documentation, Terms of sale, payment, shipment etc.Export incentives: Duty drawback, DEPB, I / E license - exchange control regulation - foreign exchange regulation acts - export management risk - export finance. WTO / GATT / MFA - Functions and objectives, successes and failures.

Reference Books

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

FINAL YEAR B. TEXT. - SEMESTER - II

8.1 CLOTHING CARE & SCIENCE (FT)

Lectures	:	4 hrs /week
Practical	:	3 hrs /week
Theory Paper	:	100 marks.
Term Work	:	50 marks
Practical Exam.	:	50 marks
Sub. Total	:	200 marks

1. **Concept of woven and knit clothing care:** Essential and desirable properties of clothing, Introduction to laundry process, Characteristics of various textile fibers, Identification of fibers, Laundry process for garment made from fibers like cotton, wool, silk, polyester and blends.

2. **Water:** Sources of water, Types of hardness, Effect of hardness of water on garments, Norms of hardness and methods of water softening

3. **Detergents:** Classification and function of soap and detergents. Composition of commercial detergents. Properties and application of various laundry agents like bleaching, optical whitening agents, stiffeners, softeners

4. **Stain removal:** Nature and classification of stains, Principle and classification of stain removals, Common stains and their removal

5. **Laundry:** Household and commercial laundry equipments like washing machine, ironing. Function of commercial laundry like hostel, hospital and hotel

6. **Dry cleaning:** Objective, Solvents used and their properties, dry cleaning equipments

7. **Dyes and pigments:** Dye / Fiber interaction, Behavior dyes and pigments during use and laundering, Grey scales, Importance and measurement of colour fastness to various agencies like washing, rubbing, light, perspiration, bleaching, dry cleaning, sublimation, acids and alkalis. Measurement of colour and terms like depth, K/S, tone, colour difference

8. **Care Labels:** Importance of care label. Various systems of care labeling, instructions for washing, drying, ironing, dry cleaning and bleaching.

9. **Environmental aspects:** Concept of banned dyes, formaldehyde, PCP, pesticides, heavy metals, their eco-norms and eco-label.

10. **Fabric properties for woven and knit clothing:** Concept, Significance, importance and evaluation of dimensional stability, serviceability, drape, pilling, abrasion, crease, thickness, surface property and texture, low stress mechanical properties and tailor-ability. Fabric properties and making up process, fabric buckling and formability. Finishes used to improve these properties and care to be taken during use and laundering.

11. **Comfort properties of garment:** Thermal, Permeability to air and moisture, water absorbency, wicking and retention.

12. **Quality parameters for assessing sewability:** Seam strength, seam pucker, seam slippage, needle cutting index and seam appearance.

List of Experiments :

1. Identification of Fibers.
2. Evaluation of colour fastness to Rubbing and Sublimation
3. Evaluation of colour fastness to Acids and Alkalis
4. Evaluation of colour fastness to Washing
5. Evaluation of colour fastness to Bleach with Hypochlorite and Peroxide
6. Evaluation of colour fastness to Perspiration
7. Evaluation of colour fastness to Dry Cleaning Solvents
8. Evaluation of dimensional stability to Washing and Dry Heat
9. Evaluation of colour fastness to Light
10. Measurement of Colour and Colour Difference using CCM
11. Removal of various Stains from garments
12. Evaluation of Seam Efficiency
13. Evaluation of Needle Cutting Index
14. Evaluation of Dimensional changes in Home Laundering of Garments.

Reference Books:

1. Fundamentals of Textile and Their Care by Dantyagi S., Oriental Longmans Ltd, New Delhi, 1980.
2. Fabric Care by Noemia D' Souza, New Age International Publications
3. Testing and quality management by V.K Khotari.
4. Textile fibers yarns and fabrics – Kaswel E. R
5. Textile Testing by J.E. Booth
6. Physical testing of textiles by B.P Saville
7. Quality Assurance for Textiles and Apparel by Sara j. Kadolph, Fairchild Pub. Inc. New York, 2007.
8. Managing Quality in Apparel Industry, by Pradip V Mehta, NIFT pub., New Delhi, 2001
9. Introduction to Clothing manufacture, by Gerry Cooklin, Blackwell science, UK, 1991.
10. AATCC Technical Manual 2004
11. Introduction to Clothing Production Management, by Chutler A J, Blackwell science, UK, 1998
12. Introduction to Quality Control, ASCQ quality Press, Marcel Dekker Inc, New. York, 1992.
13. Textile and Laundry by Priya Bhargav, Tara Chand, Common Wealth Publishers.
14. Performance of Home Textiles by Subrata Das, Woodhead Publications Ltd.
15. Comfort properties of Textiles by K. Slater Textile Progress, The Textile Institute.

FINAL YEAR B.TEXT. - SEMESTER – II

8.2 IMPORT & EXPORT MANAGEMENT (FT)

Lectures : 4 hrs/week.
Theory Paper: 100 marks.
Term Work : 50 marks
Sub. Total : 150 marks

1. Introduction to international trade.

The emerging global scenario**-**The business of international trade**-** Trade barriers**-** Foreign exchange**-**Exchange rate determination (Spot & forward)**,** The euro dollar market**-**WTO**-** Trade liberalization.

2. International marketing

Introduction- International marketing channels-Market selection and market profiling-Product strategies- Promotion strategies-Export pricing-Export finance-Export risk insurance-Export packaging and labeling- Quality control and pre shipment inspection

3. Foreign trade

Foreign trade control and-Exim policy-Export promotions-Export procedures and documents- Major problem of India's export sector

4. Firm Establishment

Introduction – Export Promotion Councils And Their Role – Registration Formalities – Registration Cum Membership Certificate – Import Export Code – Rbi Code.

5. **Foreign Trade Documents:** Need, Rationale And Types Of Documents Relating To Goods – Invoice – Packing Note And List – Certificate Of Origin – Certificate Relating To Shipments – Mate Receipt – Shipping Bill Certificate Of Measurement – Bill Of Lading – Air Way Bill – Documents Relating To Payment – Letter Of Credit – Bill Of Exchange – Letter Of Hypothecation – Bank Certificate For Payment – Document Relating To Inspection – Certificate Of Inspection – Gsp And Other Forms.

6. Import Procedure:

Import License – Procedure For Import License – Import Trade Control Regulation Procedure – Special Schemes – Replenishment License – Advance License – Split Up License – Spares For After Sales Service License – Code Number – Bill Of Entry

7. Shipment And Customs:

Pre Shipment Inspection And Quality Control – Foreign Exchange Formalities – Pre Shipment Documents. Shipment Of Goods And Port Procedures – Customs Clearance Post Shipment: Formalities And Procedures – Claiming Duty Drawback And Other Benefits – Role Of Clearing And Forwarding Agents.

Reference Books:

1. International trade and Export management – Himalaya Publication, Mumbai (1998) Francis Cherunilam.
2. Exim Policy input Output norms – Duty exemption Scheme 2002-2007, Centax publication pvt. Ltd. New Delhi(April 2003 Fourth Edition.) R.K. Jain.
3. Promotion in the Merchandising environment Kristen K, Swanson, Judith C Everett- Fairchild Publication.
4. Hand Book Of Import And Export Procedures - Paras Ram
5. Govt. Of India : Hand Book Of Import And Export Procedures.
6. Bose. A. :" Streamline Your Export Paper Work", International Trade Form, Oct – Dec 1965.
7. How To Start Export.
8. CBI Booklets – Netherland
9. ECGC Services And Guidelines
10. AEPC Booklets

FINAL YEAR B.TEXT. - SEMESTER – II

8.3 APPAREL & FASHION BUSINESS MANAGEMENT (FT)

Lectures : 4hrs/week.
Theory Paper: 100 marks.
Sub. Total : 100 marks

1. Definition Of Marketing-Marketing Management-Marketing Concept-Meaning Importance Of Marketing In Developing Countries-Consumer Concept-Difference Between Agricultural Industrial And Consumer Goods – Function Of Marketing-Marketing Environment-Various Environmental Factors Affecting Marketing Function - Marketing of Fashion Products – Importance Of Fashion Marketing

2. Market Structure, Marketing Strategy- Porters Generic Strategies, -Buyers Behavior-Buying Motive Explanation Of Motivation-Marketing Segmentation Of Different Basics. -Definition And Types Of Channels- Channel Policy- Selection Criteria-Whole Sellers Retailers And Middle Men And Their Functions - Buying Office, Buying Agency.

3. Marketing Research: Introduction-Definition, nature & Scope –An Aid to Rational Decision-Market Research Methodology – Market Research Process – Implementation - Practical Case Studies In Fashion Marketing.

4. Sales Forecasting-Various Method Of Sales Functioning-Product Policy-Fashion Product Life Cycle- Product Mix- Modification And Elimination-Brand Policy-Packing Promotions Strategy- Selling And Salesmen Ship-Steps In Selling - Brand – Branding – Meaning & Definition – Selecting a Brand Name – Characteristics Of A ‘Good Brand’ Types Of Brands. Brand – Positioning – Types Of Positioning – Various Positioning Strategies – Need For “Made In India Label” (Common – Brand)

5. Pricing- Pricing Policies, Meaning to Seller And Buyer price- -Objective Factors Influencing Price Decisions-Competitors Reaction To Price-Multi Product

Pricing Distribution Cost Analysis- Management Of Physical Distribution Marketing Risks

6. Advertising-Purpose-Budget Selecting Copy And Media-Criteria For Advertisement- Appropriation Testing Effectiveness - Visual Merchandising, Visual Merchandising Techniques- Display - Types Of Displays - Trade Fair Participation-Conducting Fashion Show- Fashion Show Norms

Reference Books :

1. Marketing Management - Philip Kotler
2. Marketing Management – Sharlekar
3. Fashion Marketing – Mike Easey(Ed), Blackwell Science
4. Marketing Management - Rajan Nair

FINAL YEAR B.TEXT. - SEMESTER – II

8.4 SMART TEXTILES & SPECIALITY GARMENTS (FT)

Lectures : 4 hrs/week.
Theory Paper: 100 marks.
Term Work : 50 marks
Sub. Total : 150 marks

1. **Geo Textiles:** Geo Textiles functions – raw material – woven, non-woven, and knitted geo textiles, Three-Dimensional Textiles and Performs – Application of geo textiles for drainage application, separation application, soil reinforcement and filtration and erosion control.

2. **Tyre Cords and Fabrics**: Requirements of tyre cord – suitability of various fibres – polyester and nylon tyre cords – manufacture of tyre cords – Physical and mechanical property requirements of tyre cord fabrics – Fabric design – Specifications. Rubberized textiles.
   Belts : Conveyor belts – physical and mechanical properties – construction of belts – manufacture of conveyor belts – power transmission belts.
   Hose: Construction and application

3. **Filter Fabrics:** General consideration of filtration of solids from liquids, solid from gases, solids from solids, liquid from liquids, liquids from gases and gases from gases.
   Nonwoven filtration: Filtration in paper, cotton textile industry and viscose manufacturing industry – Cigarette filters.

4. **Parachute Fabrics:** Functions, raw material used, manufacturing techniques, and properties.

5. **Functional Clothing:** Definition, Classification: Protective functional, Medical functional, Sports functional, Vanity functional, clothing for special needs. Role of fibre, yarn and fabric parameters on functional attributes of functional clothing. Engineering of functional clothing, Requirements from functional clothing: physiological, biomechanical, biomechanical, ergonomics, psychological. Process of material selection. Clothing design: pattern

engineering, assembling of garment components. Testing of clothing for functionality. Various principles of fit: functional ease, movement analysis, prototype testing, etc.

6. **Medical Textiles:** Sutures, Sanitary napkins, diapers, surgical dressings, healthcare textiles, medical implants like cardiovascular implants, soft tissue implants, orthopedic implants and extra corporeal devices, intelligent clothing for medical and personal health management.

7. **Electronic Textiles:** Wearable electronic / computing system in everyday use, architecture, design and interface, aspects and capabilities of wearable computing and personal empowerment, sixth sense, operational details: power supply, text input system, military applications of electronic textiles, wearable entertainment system, wearable gaming, advantages and disadvantages, future developments.

8. **Protective Clothing** – Short term and long term survival, military protective clothing, physical, environmental, camouflage and battlefield requirements for military clothing, principles of ballistic protection, technical fibres and fabrics for ballistic protection, ballistic vests and helmets, protection against fire, protection against extreme weather conditions. Space garments.

9. **Sports Clothing**: User activities, environment and requirements, Material requirements for the design of performance sportswear, high performance fibres and fabrics for sportswear, physiological comfort in sportswear, and protection in sports.

Reference Books :

1. Edited by R Shishoo, Shishoo Consulting AB, Sweden, “Textiles in sport”, Woodhead Publishing Ltd.
2. A.R. Horrocks and S.C. Anand, “Handbook of Technical Textiles”, Woodhead Publishing Ltd.
3. H. Mattila, “ Intelligent Textiles and Clothing:, Woodhead Publishing Ltd.
4. Floyd. K.L. and Taylor, H.M., Industrial Applications of Textiles,
5. Poundeyhimi. B. Vascular Grafts: Textile structures and their performance.
6. Mathews. A and Hardingham M., Medical and Hygiene Textile Production.

7. Bajaj. P. and Sengupta. A.K. Protective Clothings.
8. Indian Journal of Fibre and Textile Research.
9. Sandra Keiser & Myrna B. Garner “Beyond Design”
10. Sarah E.Braddock and Marie O’Mahony, “Techno Textiles- Revolutionary Fabrics for fashion and design

FINAL YEAR B.TEXT. - SEMESTER – II

8.5 FASHION PHOTOGRAPHY (FT) (ELECTIVE-II)

Lectures : 3 hrs/ week

Theory Paper: 100 marks.

Sub. Total : 100 marks

1. Color and Photography:

Introduction, History, Composition

Time chart – Color pertaining to slide photography; the colors of light, the balance of color, forming images, color vision, color psychology, color description – color temperature, wave lengths, focusing distances.

2. Equipment and Darkroom Techniques

Cameras, system camera, lenses, filters, light meters-their care & maintenance, supports and lights, darkroom layout and equipment- wet areas, dry areas; timers-interval, accumulative; processors- small tank, large tank, drum, automatic. Chemicals – Kodak, Beseler, Uni color, Ilford; processes – E-4, E-6, commercial, processing slides, mounting slides, printing slides, projectors and viewing – slide critique, slide presentations, audio visual designs; identifying and correcting faults, slide storage, terms and identifications.

3. Study of Natural Light:

Sun, Skies, Water, Backlighting in direct light, Indirect and reflected light, Diffused light, Early morning, Mid-day, Dusk, Night, Spring, Summer, Autumn, Winter. Adverse conditions – Taking advantages of poor light, Mist and fog, Rain, Storms, Snow and cold, Heat, Underwater photography.

4. Study of Artificial Light:

Tungsten, Flash, Mixing tungsten and flash, Mixing flash and daylight, Mixing daylight and tungsten with flash, Tungsten and flash as complete sources, Florescent, mercury vapor and mixed sources, Oil lamps, torchlight and matches, Alternative lighting.

5. Subject Lighting

Portraits, Groups, Nudes, Fashion and beauty, Children, Still life, Architecture, Architecture detail, Interiors, Animals, Indoor sports, Outdoor sports, Copying slide

Color Materials and Methods – color process, choosing color slide films – Daylight, Tungsten 3200 & 3400 degrees, Infrared, Slide copy film, Selecting the exposure,

Exposure variations, altering the image in the studio, using lenses, using filters

6. Handling Color and Light in Slide Photography

Monochromatic color, Dominant color, a touch of color, Harmonic and discordant color, Contrasting color, Tone and hue

Composition and line, Balance, position and scale, Point of interest, Shape and silhouette, Form and modeling, Texture, Pattern, Perspective, Framing, Existing backgrounds, Planned backgrounds, Movement, High speed photography, Color in close-ups, Macro-photography, Photographing through microscopes, Using reflected images, color as abstract design, Mixed images and media.

Using the changing light, Exploring the light and angle, Angle of view, Light and shade, Light Schemes on Different Costumes & Figures.

Video/Stills Production (Fashion Film)

7. Concepts of Fashion Photography:

- Fashion Photography in Context (Histories & Theories),
- Producing the Image (Studio & Location)
- Producing the Message (Shooting Collections)
- Professional Global Contexts
- Image Manipulation and Identity (Specialist Post-Production Techniques)
- Figure Shape Study
- Portrait & Glamour Photography
- Shooting Techniques of Fashion Photography

Reference Books :

1. “Fashion Photography: A Complete Guide to the Tools and Techniques of the Trade”by Bruce Smith, Crown Publishing Group (Oct 2008)
2. David D. Busch, “Canon EOS 40D Guide to Digital Photography”, Course Technology PTR; 1st edition, (2007).
3. John Hedge, “Photography Course”, John Hedge Co, 1992.
4. Michael Freeman, “Manual of Outdoor Photography”, Ziff Davis World, August 1983.
5. “Lighting techniques for fashion and glamour photography”, Stephen A.Dantzig (2004)
6. “Fashion Photography- A guide for the beginner”, Robert Randall
7. “Fashion Photography”- Scala Group
8. Vogue Photography Collection

FINAL YEAR B.TEXT. - SEMESTER – II

8.5 CONSUMER BEHAVIOUR IN FASHION INDUSTRY (FT) (ELECTIVE-II)

Lectures : 3 hrs/week.
Theory Paper: 100 marks.
Sub. Total : 100 marks

1. Introduction: Introduction to fashion concepts, Apparel Brands: National versus Private, fashion leadership theories and consumer behavior, cycle of fashion adoption, consumers' impact on marketing, the meaning of consumption, marketing's impact on consumers. .

2. Cultural influence on consumer behavior: Culture and its aspects cultural categories, Myths and Rituals, Transferring Product Meaning from Culture to Culture.

3. The Creation and Diffusion of Fashion Consumer Culture: The Creation of Culture, Culture Production Systems, Fashion Products in Movies, TV, and Video Games, The Diffusion of Innovations, Adopting Innovations, Types of Innovations, Prerequisites for Successful Adoption

4. Consumer characteristics and fashion implications: Individual Consumer Dynamics: Motivation and Values, Theories of Motivation for Wearing Clothes, The Motivation Process, Needs, Consumer Involvement, Values, Individual Consumer Dynamics: Perspectives on the Self, Self-Concept, Consumption and Self-Concept, Sex Roles, Body Image.

5. Demographic Subcultures: Age and Consumer Identity, the Youth Market, Baby Busters: Generation X, the Gray Market, Race and Ethnic Subcultures, Income and Social Class, How Social Class Affects Purchase Decisions, Status Symbols, Psychographics, Trend Forecasting, Consumer Perceptions

6. Types of consumer decision: Consumers as Problem Solvers, Problem Recognition, Information Search, Identifying Alternatives, The Family as a Decision-Making Unit. Consumer Decision-Making Process, Types of Consumer Buying Decisions, Marketing Implications of Involvement, Factors Influencing Buying Decisions, Cultural Influences on Buying Decisions, Value - Core American Values,

Culture and Advertising, Content Analysis, Consumer Fieldwork, Value Measurement Instruments, Value Measurement Survey Instruments.

7. Group Influence and Fashion Opinion Leadership: Reference Groups, Fashion Conformity and Individuality, Word-of-Mouth Communication, Opinion Leadership, Buying and Disposing, Situational Effects on Consumer Buying.

8. Ethics and consumer protection: Ethics, Consumer and Business Ethics, Social Responsibility, and Environmental Issues, The Dark Side of Consumer Behavior

9. Consumer Learning: Learning Process, Elements of Learning Theories, Behavioral Learning Theories- Concepts of Classical, Instrumental Conditioning, Modeling or Observational Learning, Conditions for Optimal Conditioning

10. Information Processing: Issues In Information Processing, Retention, Limited and Extensive Information Processing, Issues in Involvement Theory, The Elaboration Likelihood Model, Measures of Consumers Learning.

Reference Books:

1. Consumer Behavior : In Fashion By Michel R. Solomon and Nancy J. Rabolt
2. Jessica Mac Clintock , “The Fundamentals of Fashion - (Part Four)
3. Forecasting by Rita Prerna

FINAL YEAR B. TEXT - SEMESTER-II

8.5 OPERATIONAL RESEARCH (FT) (ELECTIVE II)

Lectures : 3 Hrs / Week

Theory Paper: 100 Marks

Subject Total : 100 Marks

1. Concept of optimization

2. Introduction

History, definition of operational research, concept, methodology, methods of operation research

3. Linear programming

Formulation of problem, graphical method, simplex method

4. Assignment models

Mathematical statement, methods to solve balanced and unbalanced assignment problems, branch and bound technique, Hungerian method, trans-shipment problem, travelling salesmen problem

5. Transportation models

North-west corner method, matrix minima method, Vogel's approximation, MODI method

6. Decision theory

Decision trees, decision under risk, decision under uncertainty, decision making with utilities

7. Queuing theory

Introduction, structures of queue forming situations, assumptions involved in queuing theory, Kendall's notation, classification of queuing models, Poisson's arrival and exponential service time, application

Reference books

1. An introduction to operation research- Hamdy A. Taha
2. Operation research- R. Panneerselvan
3. Optimization in operation research- Ronald L. Rardin
4. Problems in operation research- P. K. Gupta, D. S. Hira

FINAL YEAR B.TEXT. - SEMESTER – II

8.5 CAPM FOR MEN'S AND WOMEN'S WEAR (FT) (ELECTIVE-Ii)

Lectures : 3 hrs/ week.
Theory Paper: 100 marks.
Sub. Total : 100 marks

1. Introduction to Capital Asset Pricing Model (CAPM)

The formula, Security market line, Asset pricing, Asset-specific required return, Risk and diversification, The efficient frontier, The market portfolio, Assumptions of CAPM Problems of CAPM

2. Computer Aided Process Management (CAPM) in Apparel Industry

Apparel industry size and structure, Apparel Sector in global economy, the role of labor cost and theories of development, CMMS (Computerized Marker Making System), PDMS (Product Data Management Systems)

3. Manufacturing and Service Flow

Demand management and forecasting, Inventory management, Managing material flow, work flow and information flow

4. Globalization and current scenario

Concept of globalization, Strategic imperatives and the diamond framework, Issues of offshore production strategies, role of trade barriers and exchange rate fluctuations in global apparel market

5. CAPM in Supply Chain Management

Role of Category management in Men's and women's wear retailing, influence of supply chain in new product development, Design Production interface, Lean production system

6. CAPM and Quality of product

Impact of advanced apparel manufacturing technology on quality, Six Sigma, Returns Management.

Reference Books:

1. Black, Fischer., Michael C. Jensen, and Myron Scholes (1972). *The Capital Asset Pricing Model: Some Empirical Tests*, pp. 79–121 in M. Jensen ed., Studies in the Theory of Capital Markets. New York: Praeger Publishers.
2. Apparel Industry (2nd Edition), Richard M. Jones, Black well Publishers
3. "Process Management" by Joel Wisner and Linda Stanley,
4. "Computer Aided Pattern Design and Product Development" by Alison Beazley and Terry Bond, Black well Publishers
5. "Journal of Fashion marketing and management", Volume 10
6. "Managing Quality in Apparel Industry", Pradip V.Mehta, Satish K. Bharadwaj, New Age International Publishers

D.K.T.E.SOCIETY'S TEXTILE & ENGINEERING INSTITUTE, ICHALKARANJI.

Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.

FINAL YEAR B.TEXT.- T.T. (TEXTILE TECHNOLOGY) Sem – I

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	TT/MMTT	Process Management in Yarn Forming-I	I	TT/MMTT	Process Management in Yarn Forming-I	I
2	TT/MMTT	Process Management in Fabric Forming-I	I	TT	Process Management in Fabric Forming-I	I
3	TT	Structure & Properties of Fabrics	I	TT	Structure & Properties of Fabrics	I
4	TT/MMTT/TPE	Textile Mill Planning & Organization	I	TT/MMTT/TPE	Textile Mill Planning & Organization	I
5	TT/MM/TP/TC	Industrial Engineering	I	TT/MM/TP/TC/FT	Industrial Engineering	I
6	TT/MMTT/TP/TC Elective-I	Garment Manufacturing Technology	I	TT/MMTT/TP/TC Elective-I	Garment Manufacturing Technology	I
	TT/MMTT Elective-I	Textile Product Engineering	I	TT/MMTT Elective-I	Textile Product Engineering	I
	TT Elective-I	Speciality Yarns.	I	TT Elective-I	Speciality Yarns.	I
	TT/MMTT/TPE/TC Elective	Economics	I	TT/MMTT/TC Elective	Economics	I
7	TT/MM/TP/TC	Seminar-I	I	TT/MM/TP/TC	Seminar-I	I
8	TT/MM/TP/TC	Inplant Training-II	I	TT/MM/TP/TC	Inplant Training-II	I

D.K.T.E.SOCIETY'S TEXTILE & ENGINEERING INSTITUTE, ICHALKARANJI.
Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.
FINAL YEAR B.TEXT.- M.M.T.T. (MAN MADE TEXTILE TECHNOLOGY) Sem – I

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	TT/MM	Process Management in Yarn Forming-I	I	TT/MM	Process Management in Yarn Forming-I	I
2	TT/MM	Process Management in Fabric Forming-I	I	**MMTT**	**Manmade Fabric Manufacture-IV**	**I**
3	MMTT	Structure & Properties of Manmade Yarns & Fabrics	I	MMTT	Structure & Properties of Manmade Yarns & Fabrics	I
4	TT/MM/TPE	Textile Mill Planning & Organization	I	TT/MM/TPE	Textile Mill Planning & Organization	I
5	TT/MM/TP/TC	Industrial Engineering	I	TT/MM/TP/TC/FT	Industrial Engineering	I
6	TT/MM/TP/TC Elective-I	Garment Manufacturing Technology	I	TT/MM/TP/TC Elective-I	Garment Manufacturing Technology	I
	TT/MMTT Elective-I	Textile Product Engineering	I	TT/MMTT Elective-I	Textile Product Engineering	I
	MMTT Elective-I	Fibre Composites	I	MMTT Elective-I	Fibre Composites	I
	TT/MMTT/TPE/TC Elective	Economics	I	TT/MMTT/TC Elective	Economics	I
7	TT/MM/TP/TC	Seminar-I	I	TT/MM/TP/TC	Seminar-I	I
8	TT/MM/TP/TC	Inplant Training-II	I	TT/MM/TP/TC	Inplant Training-II	I

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Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.

FINAL YEAR B.TEXT.- T.P.E. (TEXTILE PLANT ENGINEERING) Sem – I

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	TP	Engineering Design of Textile Machines-II	I	TP	Engineering Design of Textile Machines-II	I
2	TP	Theory of Textile Machines-II	I	TP	Theory of Textile Machines-II	I
3	TP	Maintenance of Textile Machines	I	TP	Maintenance of Textile Machines	I
4	TT/MM/TP	Textile Mill Planning & Organisation	I	TT/MM/TP	Textile Mill Planning & Organization	I
5	TT/MM/TP/TC	Industrial Engineering	I	TT/MM/TP/TC/FT	Industrial Engineering	I
6	TT/MM/TP/TC ELECTIVE-I	Garment Manufacturing Technology	I	TT/MM/TP/TC ELECTIVE-I	Garment Manufacturing Technology	I
	TP ELECTIVE-I	Chemical Processing Machinery	I	TP ELECTIVE-I	Chemical Processing Machinery	I
	TP Elective-I	Mechatronics	I	TP ELECTIVE-I	Mechatronics	I
	TP ELECTIVE-I	Energy Conservation in Textiles	I	TP ELECTIVE-I	Energy Conservation in Textiles	I
	TT/MMTT/TPE/TC Elective-I	Economics	I	**TP Elective-I**	**Process Control in Spinning**	**I**
7	TT/MM/TP/TC	Seminar – I	I	TT/MM/TP/TC	Seminar – I	I
8.	TT/MM/TP/TC	Inplant Training-II	I	TT/MM/TP/TC	Inplant Training-II	I

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Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.

FINAL YEAR B.TEXT.- T.C. (TEXTILE CHEMISTRY) Sem – I

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	TC	Physical properties of Yarns & Fabrics	I	**TC**	**Technology of Finishing-II**	I
2	TC	Recent Advancements in Processing Machinery	I	**TC Elective**	**Advanced Chemical Processing**	
3	TC	Testing & Analysis of Textiles	I	TC	Testing & Analysis of Textiles	I
4	TC	Theory of Dyeing & Colour Measurement	I	TC	Theory of Dyeing & Colour Measurement	I
5	TT/MM/TPE/TC	Industrial Engineering	I	TT/MM/TPE/TC/FT	Industrial Engineering	I
6	TT/MM/TP/TC Elective-I	Garment Manufacturing Technology	I	**TC**	**Apparel Manufacturing Technology**	
	TC Elective-I	Advanced Polymer Chemistry	I	TC Elective-I	Advanced Polymer Chemistry	I
	TC Elective-I	Energy Management in Chemical Processing	I	TC Elective-I	Energy Management in Chemical Processing	I
	TC Elective-I	Economics	I	TC Elective-I	Economics	I
7	TT/MM/TP/TC	Seminar-I	I	TT/MM/TP/TC	Seminar-I	I
8	TT/MM/TP/TC	Inplant Training-II	I	TT/MM/TP/TC	Inplant Training-II	I

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Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.

FINAL YEAR B.TEXT.- F.T. (Fashion Technology) Sem – I

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	FT	Garment Project Planning & Implementation	I	FT	Garment Project Planning & Implementation	I
2	FT	Industrial Economics & Costing of Apparel Products	I	FT	Industrial Economics & Costing of Apparel Products	I
3	FT	Advanced Garment Construction	I	FT	Advanced Garment Construction	I
4	FT	CAD-CAM for Apparel Manufacturing	I	**FT**	**Industrial Engineering**	I
5	FT	Process Management in Apparel & Fashion Industry	I	FT	Process Management in Apparel & Fashion Industry	I
6	FT Elective-I	Fashion Accessories	I	FT Elective-I	Fashion Accessories	I
	FT Elective-I	Advanced Styling & Forecasting	I	**FT Elective-I**	**Home Textiles in Fashion**	**I**
	FT Elective-I	Textile Product Engg.	I	FT Elective-I	Textile Product Engg.	I
7	TT/MM/TP/TC	Seminar-I	I	TT/MM/TP/TC	Seminar-I	I
8	TT/MM/TP/TC	Inplant Training-II	I	TT/MM/TP/TC	Inplant Training-II	I

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Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.

FINAL YEAR B.TEXT.- T.T. (TEXTILE TECHNOLOGY) Sem – II

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	TT/MM	Process Management in Yarn Forming-II	II	TT/MM	Process Management in Yarn Forming-II	II
2	TT/MM	Process Management in Fabric Forming-II	II	TT/MM	Process Management in Fabric Forming-II	II
3	TT/MM/TP/TC	Textile Mill Management	II	TT/MM/TP/TC	Textile Mill Management	II
4	TT/MM	Technical Textiles	II	TT/MM	Technical Textiles	II
5	TT/MM/TP/TC Elective-II	Fashion Technology in Apparels & Made-Ups	II	TT/MM/TP/TC Elective-II	Fashion Technology in Apparels & Made-Ups	II
	TT/MM Elective-II	Home Textiles	II	TT/MM Elective-II	Home Textiles	II
	TT/MM Elective-II	Maintenance Management in Textile	II	TT/MM Elective-II	Maintenance Management in Textile	II
	TT Elective-II	Non-woven & Geo – Textiles	II	TT Elective-II	Non-woven & Geo – Textiles	II
	TT/MM/TP/TC Elective-II	Organizational Behaviour & Humanities	II	TT/MM/TP/TC Elective-II	Organizational Behaviour & Humanities	II
6	TT/MM/TP/TC	Seminar-II	II	TT/MM/TP/TC	Seminar-II	II
7	TT/MM/TP/TC	Dissertation	II	TT/MM/TP/TC	Dissertation	II

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Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.

FINAL YEAR B.TEXT.- M.M.T.T. (MAN MADE TEXTILE TECHNOLOGY) Sem – II

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	TT/MM	Process Management in Yarn Forming-II	II	TT/MM	Process Management in Yarn Forming-II	II
2	TT/MM	Process Management in Fabric Forming-II	II	**MMTT**	**Process Management in Weaving**	**II**
3	TT/MM/TP/TC	Textile Mill Management	II	TT/MM/TP/TC	Textile Mill Management	II
4	TT/MM	Technical Textiles	II	TT/MM	Technical Textiles	II
5	TT/MM/TP/TC Elective-II	Fashion Technology in Apparels & Made-Ups	II	TT/MM/TP/TC Elective-II	Fashion Technology in Apparels & Made-Ups	II
	TT/MM Elective-II	Home Textiles	II	TT/MM Elective-II	Home Textiles	II
	TT/MM Elective-II	Maintenance Management in Textile	II	TT/MM Elective-II	Maintenance Management in Textile	II
	MMTT Elective-II	Non-Woven & Geo – Textiles	II	MMTT Elective-II	Non-Woven & Geo – Textiles	II
	TT/MM/TP/TC Elective-II	Organizational Behaviour & Humanities	II	TT/MM/TP/TC Elective-II	Organizational Behaviour & Humanities	II
6	TT/MM/TP/TC	Seminar-II	II	TT/MM/TP/TC	Seminar-II	II
7	TT/MM/TP/TC	Dissertation	II	TT/MM/TP/TC	Dissertation	II

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Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.

FINAL YEAR B.TEXT.- T.P.E. (TEXTILE PLANT ENGINEERING) Sem – II

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	TP	Fluid Flow Systems & Controls	II	TP	Fluid Flow Systems & Controls	II
2	TP	Instrumentation & Metrology	II	TP	Instrumentation & Metrology	II
3	TT/MM/TP/TC	Textile Mill Management	II	TT/MM/TP/TC	Textile Mill Management	II
4	TP	Maintenance Management	II	TP	Maintenance Management	II
5	TT/MM/TP/TC Elective-II	Fashion Technology in Apparels & Made-Ups	II	TT/MM/TP/TC Elective-II	Fashion Technology in Apparels & Made-Ups	II
	TP Elective-II	Environmental Engineering in Textiles	II	**TP Elective-II**	**Process Control in Weaving**	**II**
	TP Elective-II	Condition Based Monitoring Techniques	II	TP Elective-II	Condition Based Monitoring Techniques	II
	TP Elective-II	Industrial Textiles	II	TP Elective-II	Industrial Textiles	II
	TT/MM/TP/TC Elective-II	Organizational Behaviour & Humanities	II	TT/MM/TP/TC Elective-II	Organizational Behaviour & Humanities	II
6	TT/MM/TP/TC	Seminar-II	II	TT/MM/TP/TC	Seminar-II	II
7	TT/MM/TP/TC	Dissertation	II	TT/MM/TP/TC	Dissertation	II

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Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.

FINAL YEAR B.TEXT.- T.C. (TEXTILE CEMISTRY) Sem – II

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	TC	Garment Processing	II	TC	Garment Processing	II
2	TC	Eco-Friendly Processing of & Environmental Management	II	**TC Elective-II**	**Textile Effluent Treatment**	**II**
3	TT/MM/TP/TC	Textile Mill Management	II	TT/MM/TP/TC	Textile Mill Management	II
4	TC	Manufacture of Technical Textiles	II	TC	Manufacture of Technical Textiles	II
5	TT/MM/TP/TC Elective-II	Fashion Technology in Apparels & Made-Ups	II	TT/MM/TP/TC Elective-II	Fashion Technology in Apparels & Made-Ups	II
	TC Elective-Ii	Processing of Yarn & Speciality Fabrics	II	**TC**	**Processing of Yarn & Speciality Fabrics**	**II**
	TT/MM/TP/TC Elective-II	Organizational Behaviour & Humanities	II	TT/MM/TP/TC Elective-II	Organizational Behaviour & Humanities	II
	TC Elective-Ii	Merchandising	II	TC Elective-Ii	Merchandising	II
6	TT/MM/TP/TC	Seminar-II	II	TT/MM/TP/TC	Seminar-II	II
7	TT/MM/TP/TC	Dissertation	II	TT/MM/TP/TC	Dissertation	II

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Equivalence of subject at FINAL Year B. Text. to Revised Textile Courses.

FINAL YEAR B.TEXT.- F.T. (Fashion Technology) Sem – II

SR. NO.	COMMON TO COURSE	PRE-REVISED SUBJECTS	SEMESTER	COMMON TO COURSE	REVISED SUBJECTS	SEMESTER
1	FT	Clothing Care & Science	II	FT	Clothing Care & Science	II
2	FT	Import & Export Management	II	FT	Import & Export Management	II
3	FT	Apparel & Fashion Business Management	II	FT	Apparel & Fashion Business Management	II
4	FT	Smart Textiles & Speciality Garment	II	FT	Smart Textiles & Speciality Garment	II
5	FT Elective-II	Fashion Communication	II	**FT Elective-II**	**Fashion Photography**	**II**
	FT Elective-Ii	Consumer Behaviour in Fashion Industry	II	FT Elective-Ii	Consumer Behaviour in Fashion Industry	II
	FT Elective-II	Operational Research	II	FT Elective-II	Operational Research	II
6	TT/MM/TP/TC	Seminar-II	II	TT/MM/TP/TC	Seminar-II	II
7	TT/MM/TP/TC	Dissertation	II	TT/MM/TP/TC	Dissertation	II