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

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
7.1	TT/MMTT	PROCESS MANAGEMENT IN YARN FORMING-I	3	---	---	3	100	50	---	---	150
7.2	TT/MMTT	PROCESS MANAGEMENT IN FABRIC FORMING-I	3	---	---	3	100	50	---	---	150
7.3	**TT**	*** STRUCTURE & PROPERTIES OF FABRICS**	**3**	**---**	**---**	**3**	**100**	**25**	**---**	**50**	**175**
7.4	TT/MMTT/TPE	TEXTILE MILL PLANNING & ORGANISATION	4	---	---	---	100	25	---	---	125
7.5	**TT/MMTT/TPE/TC**	*** INDUSTRIAL ENGINEERING**	**3**	**---**	**---**	**---**	**100**	**---**	**---**	**---**	**100**
7.6	TT	ELECTIVE-I	3	---	---	---	100	---	---	---	100
7.7	TT/MMTT/TPE/TC	SEMINAR-I	2	---	---	---	---	50	---	---	50
7.8	TT/MMTT/TPE/TC	INPLANT TRAINING-II	---	---	---	---	---	50	---	---	50
			21	---	---	9	600	250	0	50	900

Note : *Indicates modified

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LIST OF ELECTIVE-I

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

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

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
7.1	TT/MMTT	PROCESS MANAGEMENT IN YARN FORMING-I	3	---	---	3	100	50	---	---	150
7.2	TT/MMTT	PROCESS MANAGEMENT IN FABRIC FORMING-I	3	---	---	3	100	50	---	---	150
7.3	**MMTT**	*** STRUCTURE & PROPERTIES OF MANMADE YARNS & FABRICS**	**3**	**---**	**---**	**3**	**100**	**25**	**---**	**50**	**175**
7.4	TT/MMTT/TPE	TEXTILE MILL PLANNING & ORGANISATION	4	---	---	---	100	25	---	---	125
7.5	**TT/MMTT/TPE/TC**	*** INDUSTRIAL ENGINEERING**	**3**	**---**	**---**	**---**	**100**	**---**	**---**	**---**	**100**
7.6	MMTT	ELECTIVE -I	3	---	---	---	100	---	---	---	100
7.7	TT/MMTT/TPE/TC	SEMINAR-I	2	---	---	---	---	50	---	---	50
7.8	TT/MMTT/TPE/TC	INPLANT TRAINING-II	---	---	---	---	---	50	---	---	50
			21	---	---	9	600	250	0	50	900

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LIST OF ELECTIVE-I

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

REVISED SYLLABUS W.E.F.01ST JULY, 2008

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

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
7.1	TPE	ENGINEERING DESIGN OF TEXTILE MACHINES-II	3	---	---	3	100	25	50	---	175
7.2	TPE	THEORY OF TEXTILE MACHINES-II	3	---	---	3	100	25	---	---	125
7.3	**TPE**	*** MAINTENANCE OF TEXTILE MACHINES**	**3**	**---**	**---**	**3**	**100**	**25**	**---**	**50**	**175**
7.4	TT/MMTT/TPE	TEXTILE MILL PLANNING & ORGANISATION	4	---	---	---	100	25	---	---	125
7.5	**TT/MMTT/TPE/TC**	*** INDUSTRIAL ENGINEERING**	**3**	**---**	**---**	**---**	**100**	**---**	**---**	**---**	**100**
7.6	TPE	ELECTIVE -I	3	---	---	---	100	---	---	---	100
7.7	TT/MMTT/TPE/TC	SEMINAR-I	2	---	---	---	---	50	---	---	50
7.8	TT/MMTT/TPE/TC	INPLANT TRAINING-II	---	---	---	---	---	50	---	---	50
			21	---	---	9	600	200	50	50	900

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LIST OF ELECTIVE-I

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

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

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
7.1	**TC**	*** PHYSICAL PROPERTIES OF YARNS & FABRICS**	**3**	**---**	**---**	**3**	**100**	**----**	**---**	**50**	**150**
7.2	TC	RECENT ADVANCEMENTS IN PROCESSING MACHINERY	3	---	---	---	100	---	---	---	100
7.3	TC	TESTING & ANALYSIS OF TEXTILES	3	---	---	3	100	50	---	50	200
7.4	TC	THEORY OF DYEING & COLOUR MEASUREMENTS	4	---	---	3	100	50	**---**	---	150
7.5	**TT/MMTT/TPE/TC**	**INDUSTRIAL ENGINEERING ***	**3**	**---**	**---**	**---**	**100**	**---**	**---**	**---**	**100**
7.6	TC	ELECTIVE -I	3	---	---	---	100	---	---	---	100
7.7	TT/MMTT/TPE/TC	SEMINAR-I	2	---	---	---	---	50	---	---	50
7.8	TT/MMTT/TPE/TC	INPLANT TRAINING-II	---	---	---	---	---	50	---	---	50
			21	---	---	9	600	200	0	100	900

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LIST OF ELECTIVE-I

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

REVISED SYLLABUS W.E.F.01ST JULY, 2008

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

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
8.1	TT/MMTT	PROCESS MANAGEMENT IN YARN FORMING-II	3	---	---	3	100	50	---	50	200
8.2	TT/MMTT	PROCESS MANAGEMENT IN FABRIC FORMING-II	3	---	---	3	100	50	---	50	200
8.3	TT/MMTT/TPE/TC	TEXTILE MILL MANAGEMENT	3	---	---	---	100	---	---	---	100
8.4	TT/MMTT	TECHNICAL TEXTILES	4	---	---	---	100	---	---	---	100
8.5	TT	ELECTIVE -II	3	---	---	---	100	---	---	---	100
8.6	TT/MMTT/TPE/TC	SEMINAR - II	2	---	---	---	---	50	---	---	50
8.7	TT/MMTT/TPE/TC	DISSERTATION	---	---	---	6	---	50	100	---	150
			18	---	---	12	500	200	100	100	900

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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

REVISED SYLLABUS W.E.F.01ST JULY, 2008

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

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
8.1	TT/MMTT	PROCESS MANAGEMENT IN YARN FORMING-II	3	---	---	3	100	25	---	50	175
8.2	TT/MMTT	PROCESS MANAGEMENT IN FABRIC FORMING-II	3	---	---	3	100	25	---	50	175
8.3	TT/MMTT/TPE/TC	TEXTILE MILL MANAGEMENT	3	---	---	---	100	---	---	---	100
8.4	TT/MMTT	TECHNICAL TEXTILES	4	---	---	---	100	---	---	---	100
8.5	MMTT	ELECTIVE -II	3	---	---	---	100	---	---	---	100
8.6	TT/MMTT/TPE/TC	SEMINAR - II	2	---	---	---	---	50	---	---	50
8.7	TT/MMTT/TPE/TC	DISSERTATION	---	---	---	6	---	50	100	---	150
			18	---	---	12	500	150	100	100	850

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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

REVISED SYLLABUS W.E.F.01ST JULY, 2008

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

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
8.1	TPE	FLUID FLOW SYSTEMS & CONTROLS	3	---	---	3	100	25	---	50	175
8.2	TPE	INSTRUMENTATION & METROLOGY	3	---	---	3	100	25	---	50	175
8.3	TT/MMTT/TPE/TC	TEXTILE MILL MANAGEMENT	3	---	---	---	100	---	---	---	100
8.4	TPE	MAINTENANCE MANAGEMENT	4	---	---	---	100	---	---	---	100
8.5	TPE	ELECTIVE -II	3	---	---	---	100	---	---	---	100
8.6	TT/MMTT/TPE/TC	SEMINAR - II	2	---	---	---	---	50	---	---	50
8.7	TT/MMTT/TPE/TC	DISSERTATION	---	---	---	6	---	50	100	---	150
			18	---	---	12	500	150	100	100	850

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LIST OF ELECTIVE-II

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

REVISED SYLLABUS W.E.F.01ST JULY, 2008

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

SR. NO.	COMMTTON TO COURSES	SUBJECTS	TEACHING SCHEME					EXAMINATIO N SCHEME			
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
8.1	TC	GARMENT PROCESSING	3	---	---	3	100	50	---	50	200
8.2	TC	ECOFRIENDLY PROCESSING & ENVIRONMENTAL MANAGEMENT	4	---	---	3	100	50	---	50	200
8.3	TT/MMTT/TPE/TC	TEXTILE MILL MANAGEMENT	3	---	---	---	100	---	---	---	100
8.4	TC	MANUFACTURE OF TECHNICAL TEXTILES	3	---	---	---	100	---	---	---	100
8.5	TC	ELECTIVE -II	3	---	---	---	100	---	---	---	100
8.6	TT/MMTT/TPE/TC	SEMINAR - II	2	---	---	---	---	50	---	---	50
8.7	TT/MMTT/TPE/TC	DISSERTATION	---	---	---	6	---	50	100	---	150
			18	---	---	12	500	200	100	100	900

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LIST OF ELECTIVE-II

1. PROCESSING OF YARN & SPECIALITY FABRICS
2. FASHION TECHNOLOGY IN APPARELS & MADE-UPS
3. **ORGANIZATIONAL BEHAVIOUR AND HUMANITIES**
4. MERCHANDISING

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, stretch on roving quality, process control in 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/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:**

a) Object, scope and approach to achieve optimum 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 (type and quality parameters, machine adjustments) 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, Clearer Setting adjustments, 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, special devices and their adjustments on machine (auto tense, auto speed)

d) Package quality: Causes and Remedies of package defects: -i) Cobweb, ii) transfer tail, iii) nose tail, iv) external package damage, v) cauliflower, vi) hard and soft yarn layers, vii) package density, viii) LH & RH end on flack, ix) loose end, x) Patterning, xi) Yarn guiding failures, xii) double ends, xiii) sloughing yarn layers,

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 & 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 spares

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 in the visiting weaving unit
9) Inspection and mending 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,
4) Sriramulu.
5) ATIRA, BTRA Publications for Norms on Winding, Warping, Drawing in Looms.
6) Machine Manuals of Various Shuttle less Looms and – Preparatory Machines.

7) Preventive Maintenance of Plain and Auto Loom – By BTRA.
8) Manual of shuttle less Weaving: PSG College Publication.
9) Shuttle less Weaving: NCUTE Publication.
10) 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 – Methods of measuring thermal transmission Factors affecting thermal transmission – Emissivity and feeling of coldness of fabrics.

III) **Air – Permeability -** Nomenclature, Measurement, Factors affecting Air Permeability of Fabrics, Influence of Air permeability on comfort aspects of clothing.

IV) **Moisture Transmission -** Nomenclature and Measurement, Moisture permeability properties of fabrics.

V) **Water repellency and Water Resistance -** Nomenclature, Methods of Measuring water repellency, Mechanics of Wetting, Factors influencing water repellency – Water repellent Properties of Textile Fibres and structures.

VI) **Crease Retention Wrinkle Resistance & Dimensional Stability -** Nomenclature, Methods of Measurement, 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, dimensional stability and shape retention.

VII) **Compressional Resilience of Fabrics -** Nomenclature, Methods of measurement – compressional resilience properties of textile structures – Effect of various factors on compressional resilience.

VIII) **Abrasion and Wear Resistance -** Nomenclature and methods of measurement, Mechanics of abrasion. The inherent abrasion resistance properties of fabrics, Inherent wear resistance properties of fabrics, Relationship between abrasion resistance and wear resistance. The influence of yarn and fabric geometry on abrasion and wear resistance, direction of abrasion.

IX) **Fabric Hand -** Objective and subjective evaluation of textiles, hand and drape nomenclature, methods of measuring fabric stiffness and drape, frictional properties of fabrics and Hand, influence of fibre properties on fabric hand. Measurement of fabric hand by KAWABATA technique, FAST technique etc.

X) **Luster -** Subjective aspects of luster, Physics of light reflection in luster, Measurement of Luster, effect of fabric construction on luster.

List of Experiments

2) Estimation of Fabric Wear performance by using Universal Wear Tester.
3) Comparison of Crease Recovery of Grey & Resin Finished Cotton Fabric.
4) Analysis of different Weave fabrics for its Cover Factor & GSM.
5) Estimation of Thermal Insulation Behaviour of different Weave/Cover/Fibre types of fabric.
6) To estimate the Water proofing ability of fabric by water head tester
7) To assess the pilling performance of Various fabrics
8) To compare the Bursting performance of Woven & Knitted fabrics of same Cover Factor.
9) To determine the Stiffness & Drape of Woven & Knitted Fabrics.
10) To study the air permeability of a fabric for its suitability for various applications.
11) To Study the Bending behaviour of different Weaves by Cyclic Bending Test.
12) 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) **Machinery Specification, Selection & Calculation for No. of Machines** - Selection of machines & machinery specifications required for the product in spinning, weaving, knitting etc.

Calculation for no. 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 no. of machinery required at different stages of processing.

Calculation for no. 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 no. of machinery required at different processes.

III) **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.

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) **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.

VII) **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.

VIII) **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.

IX) **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) 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.

FINAL YEAR B. TEXT - SEMESTER-I

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

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) **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, MTM, problems.

IV) **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.

V) **Plant Location –** Importance of site selection, factors affecting, urban, rural & suburban area, selection of site for textile & engineering plant.

VI) **Plant Layout –** Factors affecting plant layout, Types of plant layouts, Layout procedure, Use of computer in plant layout.

VII) **Value Engineering –** Value, concept of value analysis, concept of value engineering, Reasons of unnecessary cost, value analysis procedure.

VIII) **Job Evaluation & Merit Rating –** Objectives & methods.

IX) **Inventory Control –** Concept, Types, ABC Analysis, EOQ, EBQ.

X) **Machine Interference –** Introduction, Ideal automatic machines, semi automatic with cycle servicing – semi automatic with random servicing.

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

Introduction, importance, need of specialty yarns & applications, Classification of yarns.

I) **Elastane Yarns**:– End use application, spinning of lycra yarns on ring spinning, necessary modification on machine, process parameters, production, yarn properties.

II) **Cover & Core yarns**: - Principles of formation of yarn, constructional details of machine, process description, production of different types of cover & core yarn, yarn properties & end uses.

III) **Twisted Yarns**: - Filament twisting, different types of twisted yarns, manufacturing & yarn properties, Fancy twisted yarns. Structures & properties of different filament twisted yarn. Twist setting of yarn.

IV) **Melange Yarn**: - Concepts of producing mélange yarn. Process and sequence used for production of Melange yarn. Suitability of yarn in different end uses.

V) **Compact Yarns**: - Definition, Importance of compact yarns. Different techniques used for the production of compact yarns, Machines and parameters used to make compact yarns. Yarn structure & physical properties of compact yarn. Application of compact yarns in different end uses.

VI) **Special Yarns on Unconventional Spinning Technologies**: - Manufacture Properties & end uses of the Cover, Siro, Bobtex, Self-twist, Twistless, etc. Concepts of composite yarns

VII) **Hosiery Yarns**: - Requirement of hosiery yarn. Raw material for hosiery yarn, Process sequence & process parameters to make hosiery yarn form Cotton, Polyester, viscose & their blends. Properties and end use applications of hosiery yarns.

VIII) **Dyed Yarns**: - Requirement of dyed yarns. Types of dyed yarns – Fibre dyed yarn, dope dyed yarn. Dyed yarns from cheese, yarn dyeing. Process sequence & machine required for production of above yarns. Yarn properties & applications.

IX) **Singed Yarn**: - Hairy yarn Vs hair free yarn. Methods of singeing of yarn. Machine description & process parameters to produce singed yarns. Change in properties of yarn after singeing.

X) **Mercerised Yarn**: - Necessity of mercerization of yarn, Machine & sequence for yarn mercerization, Prograde process. Yarn characteristics of mercerized yarn.

XI) **Metallised Yarns**: - Concepts of Metallic and Metallized yarns, Characteristics of metallized yarn – Manufacture of metallized yarns & their properties, Applications of yarns.

XII) **Special Textured Yarn**: - Manufacture of specialty yarns from different filaments on Draw Texturisng, Air jet Texturising, and Chemical Texturising etc.

XIII) **Sewing Threads**: - Introduction of Thread construction, Characteristics of sewing threads, production methods, Types of thread package, Thread storage & degradation.

XIV) **Tyre Cords**: - Textiles in Tyres, Required properties of initial yarns. Structure of twisted cord yarns, Cord twisting, Cord fabric manufacturing. Properties of tyre cords.

XV) **Ropes, Cordage, & Twines**: - Requirements of initial fibres & yarns, Manufacturing process, structures & properties of yarn.

XVI) **Film Yarns**:- Flat film yarns, fibrillated film yarn manufacture, Properties & application of these yarns.

XVII) **Embroidery Yarns, Laces & Braids**: - Introduction, Process sequence, Manufacturing details & Machines required. Properties & application of embroidery yarns, Laces & Braids.

XVIII) **Neppy and fleck yarn**: - Manufacture Neppy and fleck yarn, production, properties of yarn & application.

XIX) **Manufacture of some special purpose yarns like**:– Slub, double twist, Cord yarn, Silk hourette, Knop yarn, Special Open end yarns, Cables, Stretch yarn, Crespino, Boucle, Chenille yarn, Jaspe, Diamond yarn, Eccentric yarn, Boucle yarn, Button yarns & Reverse Twist, etc.

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.

3) 'Yarn Dyeing 98' Tech. For a Changing Industry' By AATCC, American Asst. of Textile Chem. Colorists Publisher.
4) 'Worsted Spinning' Textile Progress, Vol.11, No.2 by DE Henshw, The Textile Inst. Publisher.
5) The production of textured yarns by the false – twist technique' Textile progress vol.21 no.3, By D K. Wilson and T. Kollu, The Textile Inst. Publisher.
6) Woollen – Yarn manufacture' Textile progress, vol.15, no.1/2 by D.A. ROSS, The Textile Inst. Publisher.
7) '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.
8) 'Progress in Air – Jet Spinning' Textile progress vol.29, No.3, By A Basu, The Textile Inst. Publisher.
9) The production of textured yarns by methods other than the false twist technique textile progress, vol.9, no.3 by D.K. Wilson, The Textile Inst. Publisher.
10) Yarns & Fabric Classification Main Items in wool and blends, Italtex Editor.
11) Textile guide synthesis to create yarns & fabrics, Italtex Editor.
12) Fancy yarns: Their manufacture and application R H Gong and R M Wright, UMIST, UK, The Textile Inst. Publisher.
13) The Textile Institute Publication - Manual of Textile Technology – Short Staple Spinning Series Vol.V – New Spinning System by W. Klein.
14) Fundamentals of staple yarn manufacture: Lawrence Carl.
15) "Different technologies to spin compact yarns" by V K Kothari, The Indian Textile Journal –Aug. 2007.

FINAL YEAR B. TEXT - SEMESTER-I

7.6 GARMENT MANUFACTURING TECHNOLOGY (TT/MMTT/TPE/TC) (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) **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) Application 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, assept or drower, 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.

III) **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.
- ❖ .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. Preparation of basic blocks, muslin pattern, commercial pattern, sizes and its understanding, fabric preparation for garment construction.
- ❖ CAD/CAM in Garment Manufacturing.

Reference Books

1) Garment Technology for fashion designers by Gerry Cooklin
2) Introduction to clothing Manufacturing by Gerry Cooklin
3) Clothing construction and wardrobe planning by Dora S. Lewin, Mabel Goode Bowers, Manetta Knttunen — The Macmillan co New York
4) Garment Technology by Dr. V.Subramaniam — Winter School booklets 1990
5) BIS publications 1989.

FINAL YEAR B. TEXT - SEMESTER-I

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

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

I) **Product Engineering** – Scope and objectives, Product design procedure, Selection of raw material and product, Product analysis, Production aspect, Product design, Consideration of a good product design, Design specifications, Preliminary design, Maintainability, Reliability and Redundancy, Final design, Modular design, Computer aided design, Process selection, Product life cycle, Criteria for product success.

II) **Market Research & Customer Requirement Analysis** – Product Research – Market Research, Material Research, Equipment and process research, Benchmark analysis, Customer requirement analysis. Product Appraisal – Functional and aesthetic analysis, Manufacturing and economical analysis.

III) **Textile Designs** – Printed and constructed designs, range planning, Range development, Range presentation, Retailing business, Merchandising, Information generation. Design for quality, Essential, Desirable and undesirable properties of textiles, Effect of changes in fibre, yarn type and fabric construction and finishing on performance and serviceability of textile products.

IV) **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.

V) **Case studies related to following product development** – Design of non – woven for filtration, Development of needle punched fabrics for geo technical applications, Design of Suture threads, twines & ropes, Geo textiles, Parachute etc.

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/TPE/TC)

(ELECTIVE-I)

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

I) **Definition of Economics** – Nature and scope – Economy – Types – Problems and functioning – Basic terms and concepts

II) **Human Wants** – Consumption and standard of living – Demand Analysis – Consumer's surplus – Demand and law of demand – Elasticity of demand.

III) **Scale of Production** – Laws of returns – Costs and cost curves – Supply and supply curves – Markets and market forms – Equilibrium of the firm and industry.

IV) **Price Determination under perfect competition** - A preliminary Idea – 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 – Monetary standards – Theory of money and prices.

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

VII) **International Trade** - Balance of payments – Foreign exchange rate determination.

VIII) **Public Expenditure** – Public revenue – Taxation – Public Finance – Public Debt.

IX) **Economics Systems** - Capitalism – Socialism – Mixed Economy

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)

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

Topic -

In the beginning of the semester, every student individually 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 Preparation and Presentation -

Students will collect the information on the above subjects and submit the report both soft and hard copy on the dates specified by the concerned faculty. The seminar report will be of minimum 15 pages. The spacing between the lines will be 1.5. The font size will be 12 point with New Times 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.

Term Work Marks –

Seminar Report	-	25 Marks
Presentation	-	25 Marks

FINAL YEAR B. TEXT - SEMESTER-I

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

Term Work : 50 Marks
Subject Total : 50 Marks

Objective:

To provide an opportunity to observe industrial activities and gather related technical and non-technical information about industry working.

Training Period:

One Month after completion of second semester of Third Year B.Text.

Industry:

Spinning, Weaving, Garment, Processing, Synthetics, Textile Chemicals & Auxiliaries, R&D, Machinery Manufacturing, Marketing etc. (Any One).

Observations:

Observe working of industry and collect data as per guidelines in the manual, study machineries / systems / practices.

Training Report:

* 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 Department wise / Product wise Report: Report should (Onwards) 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 and external examiners from related field.

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 fibres in yarns, idealized packing and packing in actual yarn. Influence of twist in man-made fibres on other yarn properties.

III) **Form and fibre arrangement in twisted yarns –** Fibre migration – Ideal migration, Characterization of migration behavior, Factors affecting migration of man-made fibres in the yarn.

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. Observed extension & breakage of continuous filament yarn. Terminology and definitions of the same, breakage effect of twisting method on tensile properties.

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) **Structure of Fabric -** Classification & Structures of fabrics, geometrical properties of fabrics made from man-made fibre yarn.

VII) **Transmission properties of Textile Structures - i)** Thermal transmission – terminology, factors affecting thermal behaviour of fabrics, measurement of thermal behaviour. **ii)** Air permeability – Nomenclature, factors affecting air-permeability. Measurement of air-permeability **iii)** Moisture Transmission – Nomenclature, factors influencing moisture transmission, measurement of moisture transmission ability of fabric. **iv)** Water Repellency and Water Proofing: -

Nomenclature, Mechanics of wetting, factors affecting water repellency of textiles, water proofing, measurement of water proofing & water repellency.

VIII) **Crease Retention, Wrinkle Resistance & Dimensional Stability -** Nomenclature, mechanics of wrinkle resistance, factors influencing the wrinkle resistance & its measurement, dimensional stability & shape retention.

IX) **Serviceability, Wear & Abrasion -** Nomenclature, serviceability, wear & abrasion. Mechanics of abrasion, Influence of fabric/yarn/fibre structural parameters on abrasion resistance of fabric, Measurements of abrasion, Analysis of end point for abrasion resistance.

X) **Fabric Hand -** Objective & subjective evaluation of textiles, Hand & drape- Nomenclature, Methods of measuring fabric stiffness & drape. 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) Analysis of different Weave fabrics for its Cover Factor & GSM.
9) To Study the Bending behaviour for Filament & staple Yarn Fabric by Cyclic Bending Tester.
10) To determine Air permeability of different Fabrics.
11) 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

I) **Introduction** – Definition, General Characteristic, Applications

II) **Materials** – Fibres, Matrix, Thermoset matrix, thermoplastic matrix, fibre surface treatment, fillers and other additives, incorporation of fibres into matrix, fibre content, density & void content

III) **Mechanics** – Fibre - matrix interactions in a unidirectional lamina, characteristics of fibre reinforced lamina, Laminated structure, Inter lamina stresses.

IV) **Performance** – Static, mechanical properties fatigue properties, impact properties, other properties, environmental effects, long term properties, fracture behaviour & damage tolerance.

V) **Manufacturing** – Fundamental, Bag molding process, compression molding, pultrusion, filament winding, other manufacturing process, Manufacturing process for thermoplastic composites, quality inspection methods.

VI) **Design** – failure predictions, laminate design considerations, joint design, design examples, application examples.

VII) **Metal and ceramic Matrix composites** – Metal Matrix composites, ceramic Matrix composites,

VIII) Analysis and modeling 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

I) **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.

II) **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.

Construction, classification & selection of rolling contact bearing, mounting & dismounting of rolling bearing, static & dynamic capacity, selection of bearing from catalogue.

III) Cost consideration in design, Ergonomics, standardization.

IV) **Design consideration of machine frames** – Design consideration of machine frames, bed, covers and bodies, design consideration for casting, forging & fabricated parts.

V) **Design of pressure vessel** – Classification, design of thick & thin cylinders, Autofrettage, Compound cylinder, end closures.

VI) **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.

Terminology of Helical gears, virtual number of teeth, force analysis, beam strength & wear strength of helical gears.

VII) **Design considerations of Bevel gear & worm and worm wheel** – Terminology of bevel gears, force analysis, beam strength & wear strength of bevel gears.

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.

VIII) 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

I) **Balancing** - Static and Dynamic Balancing of rotary masses. Balancing machines. Balancing of textile machine components – carding cylinder, spindles of Ring frame.

II) **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.

III) **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.

IV) **Brakes and Clutches** - Simple band brake, Band & block brake, shoe brake. Different types of clutches – plate & cone clutches. Application to textile machines.

V) **Vibrations** - Longitudinal, torsional vibrations, free and forced vibrations, natural frequency. Whirling of shaft, critical speed.

VI) **Antifriction and sliding bearings** - Construction, classification, mounting, maintenance & application to textile machines.

VII) Different types of drives used in spinning. PIV, VPS, frequency controlled drive and applications.

VIII) 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

I) **Maintenance** – concept, importance, objectives of maintenance, Breakdown & planned maintenance subclassification of planned maintenance, Procedure for planning, schedules for preventive maintenance.

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

III) **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.

IV) **Study of aprons & cots** used in spinning & their maintenance.

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

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

VII) Basic concept of lubrication, types of lubricants used for textile machines, Lubricant storage handling, precautions.

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

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

X) **Maintenance of shuttleless weaving machines** - Approach towards maintenance of latest weaving machines, Critical maintenance points of various shuttleless weaving machines.

XI) Recording of maintenance activities & its importance.

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, review of microprocessor & microcontroller based controllers, PC based controllers, proportional, integral, differential controller, digital controller, adaptive controller.

II) **Drives in mechatronics** – Electrical motors, stepper motors, sevo 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) **PLC controller & ladder diagram fundamentals –** Basic concept, fundamentals, PLC configuration, block diagram, PLC logic, ladder diagram construction, interfacing of sensors & actuators.

V) **Fundamentals of PLC program –** Programming & physical components, basic PLC programming procedure.

VI) **MEMS Micro electro mechanical systems –** Materials, sensors, actuators, fabrication methods, application of MEMS examples, Accelerometer, humidity micro sensor.

VII) **Design of Mechatronic System –** Design process, comparison of traditional and mechatronic design, some case studies piece counting, robotic walking machine. Autofeed 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 (TPE) (ELECTIVE-I)

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

I) **Introduction to Textile wet processing machinery** - Machinery for pretreatments, dyeing, printing preparatory, printing, drying and finishing. Machinery for fabric folding, yarn processing equipments, garments processing and machinery for special effects.

II) **Shearing and Cropping machine** - Various types of shearing machines for woven fabric, surface shearing for terry towels, carpets, etc. Working and maintenance of shearing and cropping machine.

III) **Singeing Machine** - Construction, working and maintenance of singeing machines. Various types of gas singeing machines for woven and knit goods.

IV) **Scouring Machine** - Various types of kiers with different methods of heating system, Vapor lock machine, Tumbler solvent scouring machine and continuous solvent scouring machinery. J-box for continuous scouring, pad-roll system of scouring.

V) **Bleaching Machine** - Equipments for conventional bleaching. Bleaching on super jumbo jiggers, Hydraulic jigger and continuous bleaching range.

VI) **Washing and Relaxing Machines** - Open width and Rope form washing machines. Water extraction equipments of different mechanism like centrifuging, mangling, suction.

VII) **Mercerizing Machine** - Yarn mercerization machines, fabric mercerization machines like pad chain, pad chainless and padless – chainless. Caustic recovery plant.

VIII) **Machinery for knit goods** - Reversing machine, hose cutting, singeing machine, mercerising machine, continuous bleaching range. Relax Dryer, Compactor, Stenter, Tumble dryer.

IX) **Dyeing machinery** - Batch and continuous fibre dyeing machine, Hank dyeing m/c., Package dyeing machine, different types of packages.

Jigger, different types of Jiggers, winch dyeing machine, Horizontal beam dyeing machine.

Pad batch and continuous open width fabric dyeing range. Different types of padding mangles. Different types of Jet dyeing machines, Soft flow, over flow & air flow dyeing machine.

X) **Printing Machinery -** General aspects of Textile Printing machinery. Study of roller printing machine. Study of construction & working of rotary printing m/c. & flat bed printing machine. Method of preparation of screen for flat bed and rotary screen printing machine. Continuous & cut panel thermo transfer printing. Developments in printing machines. Inkjet printing machines. Study of agers, steamers & polymeriser.

XI) **Finishing machinery -** General out line of finishing processes. Drying equipments like V.D.R., Float dryer, stenter for drying & finishing. Study of thermic fluid heater. Other finishing machines like friction calender, schriener calender, felt calender, sanforising machine, decatising, raising machine, Peach finish machine. Aero finish machine, heat recovery system.

XII) **Garment Processing machine -** All types of paddle dyeing machine, Tumble dyeing m/c. High temperature garment dyeing machine. Machinery used for printing of garments & finishing of garments.

Reference Books

1) Handbook of Textile processing machinery by R.S. Bhagwat
2) Dyeing of polyester & its blends by Prof. M. L. Gulrajani
3) Engineering in Textile coloration by C. Duckworth
4) Norms for Textile Machinery – N.T.C.
5) Technology of Printing by Dr. V.A. Shenai
6) Technology of finishing by J.T. Marsh

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

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

II) **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.

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

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

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

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

VII) Conservation of electrical energy in weaving and humidification plants.

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

IX) 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

7.1 PHYSICAL PROPERTIES OF YARNS & FABRICS (TC)

Lectures	:	3 Hrs / Week
Practicals	:	3 Hrs / Week
Theory Paper	:	100 Marks
Practical Exam.	:	50 Marks
Subject Total	:	150 Marks

I) Linear Density of Yarn - Count or yarn number Direct and indirect systems of yarn numbering – Measurement of yarn number or count, Yarn count and yarn diameter.

II) Twist and Twist Measurement - Definition – Twist direction – Amount of twist – Twist multiplier/Factor –Function of twist in yarn structure – Twist and yarn strength – Effect of twist in yarn on fabric properties – Measurement of twist in single and double yarns – Straightened fibre method – continuous twist tester – Twist contraction method, twist to break test – Twist measurement by microscope.

III) Yarn Strength – a) Single thread strength - The effect of fibre properties on the yarn strength, factors affecting the tensile properties & the results obtained from testing instruments. Different principles of tensile testing of yarns – The pendulum lever principle, the inclined plane principle, the strain gauge transducer principle, the machine working on these principles. Comparison of Tensolab, Tensorapid, Instron. b) Lea Strength - The lea CSP or Break factor & its significance – Description of lea strength tester, comparison of lea & single thread test results, ballistic test & its importance.

IV) Evenness of Yarn – Classification of variation, Expression of irregularity, Basic irregularity, index of irregularity. Addition of irregularities, Measurement of yarn irregularities, visual examination, cutting & weighing method, electronic capacitance principle, variation of thickness under compression, photoelectric testers, Analysis of irregularity – VL – BL curves, spectrogram analysis, correlogram, causes of irregularity, interpretation of results of irregularity tests, effect of irregularity on the fabric behaviour. Imperfections & classimat faults, principle & working of uster classimat, Analysis of classimat faults, Hairiness in spun yarn, causes & reduction of Hairiness. Measurement of hairiness.

V) Sampling of Fabrics.

VI) Dimensional characteristics - Length, width & thickness and their measurement, importance of thickness.

VII) Threads/Unit length – EPI and PPI, count warp count, weft count, weight of fabric – weight per unit length, weight per unit area, warp & weft crimp, effect of crimp on the fabric properties, Measurement of crimp, fabric cover – cover factor.

VIII) Fabric Strength – Tensile strength testing – cut strip method, Grab test method, comparison between strip test & grab test, Tear strength testing – Measurement of tear strength – different methods of testing, ballistic test, bursting test & its measurement.

IX) Fabric abrasion & Handle of fabric – Serviceability, wear, abrasion, testing of abrasion resistance, assessment of abrasion damage, the BFT abrasion testing machine, Martindale abrasion tester.

X) Pilling of fabrics Pills, mechanism of pilling, factors responsible for pilling, effect of pilling, remedies ICI Pill Box Tester.

XI) Fabric Stiffness, Handle & Drape –Handle, drape, measurement of drape, stiffness, Shirley stiffness tester (cantilever test), Heart loop test.

XII) Crease resistance & crease recovery, measurement of crease recovery.

XIII) Air permeability, water fabric relations – air permeability, air resistance, air porosity, SHIRLEY air permeability tester, water proofing & water repellency, wetting time test, spray test. Drop penetration test, the bundesmann testers water head tester.

XIV) Flammability – Flame retardancy, flame proofing and flame propagation, mechanism of flammability, measurement of flammability – concept of LOI.

List of Experiments

1. To determine the count of given yarn sample.
2. To determine the twist of given single / double yarn sample.
3. To determine the single yarn strength of given yarn sample.
4. To study the evenness properties of yarn by premier evenness tester.
5. To determine the strength of a yarn in the form of lea.
6. To determine the cover factor of given fabric sample.
7. To determine the tensile strength of given fabric sample.
8. To study the abrasion and pilling performance of given fabric sample.
9. To study the fabric stiffness and drape characteristics of given fabric sample.
10. To determine the tearing strength of given fabric sample.

Reference Books

1. Principles of Textile Testing by J.E. Booth.
2. Textile Testing by Anagappan & Gopalkrishnan
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. Physical Testing of Textiles by B.P. Saville

FINAL YEAR B. TEXT - SEMESTER-I

7.2 RECENT ADVANCEMENTS IN PROCESSING MACHINERY (TC)

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

I) Pre-treatment machinery

Shearing and Cropping machine, Various types of shearing machines for woven fabric, surface shearing for terry towels, carpets.

Gas singeing machines for woven and knit goods,

Scouring in open width form, Continuous bleaching range, J-Box. Open width pre-treatment on jiggers, pad – roll system, solvent scouring system.

Yarn mercerization machines, fabric mercerization machines like pad chain, pad chainless and padless – chainless. Mercerizing machines for knitted goods. Liquid ammonia mercerization machines, Advancement in mercerization with respect to energy & water consumption & high production.

II) Dyeing Machinery

Batch and Continuous fibre dyeing machine, Hank dyeing m/c., Package dyeing machine, Jiggers, winch dyeing machine. Pad batch and continuous open width fabric dyeing range. Advancements like, wet on wet application, auto dosing system, e-control, impregnators, washing units, extractors.

Jet dyeing machines, Soft flow, over flow & air flow dyeing machines.

III) Printing Machinery

Rotary printing machine, flat bed printing machine. Agers, steamers polymerisers & their advancements.

Ink jet printing machines, flock printing machine, Continuous & cut panel thermo transfer printing.

IV) Finishing machinery

Vertical Drying Range, Float dryer, Stenters, thermic fluid heater. Other finishing machines like friction calender, schriener calender, felt calender, sanforising machine, decatising, raising machine, Peach finish machine. Aero finish machine. Relax Dryers, Compactor. Low liquor application techniques & coating machinery.

V) Garment Processing machine

Paddle dyeing machine, Tumble dyeing machine, High temperature garment dyeing machine. Machinery used for printing of garments & finishing of garments like fusing lamination.

VI) Energy & Water Conservation

Advancements in machines for energy & water conservation like heat exchangers, heat recovery system, steam recycling, water softening & treatment, thermal economizers, microprocessor control system for different purposes.

Reference Books:-

1) Handbook of Textile processing machinery by R.S. Bhagwat
2) Dyeing of polyester & its blends by Prof. M. L. Gulrajani
3) Engineering in Textile coloration by C. Duckworth
4) Norms for Textile Machinery – N.T.C.
5) Technology of Printing by Dr. V.A. Shenai
6) Technology of finishing by J.T. Marsh

FINAL YEAR B. TEXT - SEMESTER-I

7.3 TESTING AND ANALYSIS OF TEXTILES (TC)

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) **Introduction -** Importance of testing, Sampling, Introduction to standards like ISO, ASTM, AATCC and BIS.

II) **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.

III) **Evaluation of Functional Finishes -** Importance and principle of evaluation of functional finishes like Durable Press Rating, Flammability, soil release, Anti-microbial and Sun Protection.

IV) **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.

V) **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.

VI) **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.

VII) **Chromatography -** Classification of chromatographic methods, Concept, Principle, Working and Application of Gas Chromatography, High Performance Liquid Chromatography

VIII) **UV-Visible Spectroscopy -** Introduction, laws, instrumentation and application of UV – Visible spectroscopy.

IX) **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 water extracted from finished fabric
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 Flammability.
17. Evaluation of Seam Strength.

Reference Books

1. Manual of Standards like ASTM, AATCC, ISO and BIS.
2. Chemical finishing of Textiles by W. D. Schindler and P. S. hauser, Iextile Institute, Woodhead Publishing Ltd., Cambridge, UK.
3. Physical Testing of Textile by B. P. Saville.
4. Fabric Care by Noemia D'Souza, New Age International Publisher.
5. Chemical Testing and Analysis, Editted by P. W. Harrision, Textile Progress, Vil. 10, No. 4.

6. Evaluation of Textile Chemicals by V A Shenai and R. H. Mehara, Sevak Publication, Mumbai.
7. Ecofriendly Textile – Challenges to Textile Industry by Textile committee.
8. Vogel's Text Book of Quantitative Analysis Revised by G H Jeffery, J. Mendham, R C Denney, ELBS with Longman Publisher
9. Instrumental Methods of Analysis 7th Edition by H.H. Willard; L.L. Merritt, John A Dean, Frank A Settle, Jr. CBS Publishers & Distribution Delhi.
10. Instrumental Methods of Chemical Analysis 5th Edition by Galen W. Ewing.
11. Elementary Organic Spectroscopy – Principles and Chemical Applications by Y.R. Sharma.
12. Spectroscopy of Organic Compounds by P.S. Kalsi
13. Basic Concepts of Analytical Chemistry, 2nd Edition by S.M. Khopkar
14. The Analytical Chemistry of Synthetic dyes Edited by K. Venkataraman. Wiley – Interscience Pub. John Wiley & Sons New York.

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 2^{o} and 10^{o} 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 - 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 - 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 – conducting polymers – conducting mechanisms – 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.

FINAL YEAR B. TEXT - SEMESTER-I

7.6 ENERGY MANAGEMENT IN CHEMICAL PROCESSING (TC) (ELECTIVE-I)

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

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

II) **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.

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

IV) **Energy Generation from Fuels: -** Need of thermal energy in textiles, methods, quality & efficiency of fuels, economics of co-generation, efficient steam generation & utilization. Thermopac

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

VI) **Conservation of Electrical Energy in Processing:-** Methods of energy conservation in various departments of process house with regards to electrical energy.

VII) **Conservation of Thermal Energy:-** Methods of energy conservation in various departments of process house with regards to thermal energy.

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

IX) 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-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, maintenance schedules specific maintenance activities from blow room to ring spinning.

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

X) **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.

FINAL YEAR B. TEXT - SEMESTER-II

8.2 PROCESS MANAGEMENT IN FABRIC 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 weaving (loom shed) for Fabric quality**

a) Causes & remedies for yarn related faults: Weft bars, black ends, slubs, 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. (Wavy and irregular selvedge, temple marks, torn fabric, faulty weft transfers, end breaks position along the warp, weft stitching, snarls, irregular weft densities, promoting trails on selvedges, stitches, weft buckling.)

d) Fabric quality evaluation systems such as manual, and automatic fabric inspection methods, various grading systems such as major / minor, point system and fabric scan.

II) **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) 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) Optimum loom allocations

f) Control of down time through SMED technique

g) Use of snap study in controlling efficiency losses

h) Management information system to control productivity

III) **Maintenance of machines in weaving**

a) Equipment deterioration and need of maintenance,
b) Basic aspects of maintenance, prerequisites and factors affecting maintenance activity
c) Importance of maintenance, maintenance activities (primary, Secondary areas of maintenance)
d) Objectives, maintenance policies, forms of maintenance. (Planned & unplanned maintenance). Optimum planned maintenance.
e) Cost of maintenance: elements of cost, direct & indirect costs.
f) Breakdown, preventive, corrective and predictive maintenance
g) Concept of preventive maintenance (PM) comparison with breakdown maintenance
h) Work activities in preventive maintenance: cleaning, lubrication, inspection (in detail),
i) Steps in preventive maintenance scheme.
j) Levels of preventive maintenance: productive, operative, functional, area deferred fixed time, opportunity, modular and assigned preventive maintenance.
k) Benefits of preventive maintenance and limitations
l) Maintenance of sophisticated machinery in weaving

IV) **Study of warp and cloth control**

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

Causes for pick space variation

Shed geometry for various fabrics setting, effect of back rest level

V) **Study of warp and weft tension during weaving**

Tension variations on automatic and shuttle less looms

Acceleration and retardation behaviour of weft for all shuttle less looms

VI) **Renewed concepts of fabric geometry**

Theory discussed by Peirce, Hearl & Shanahan

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

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

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.
9) 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) **The Basic of Management Theory & Science** - Management & society: social responsibility & ethics.

II) **Planning** – The nature & purpose of planning – objectives – strategies – polices – planning premises.

III) **Organizing** – The nature & purpose of organizing - Basic departmentation - Organisation structure - Forms of Business organization.

IV) **Staffing** – Human resource management & selection - Performance appraisal & career strategy - Manager & organization development.

V) **Leading** – Managing & human factor - Motivation – leadership -Communication.

VI) **Controlling** – The systems & process controlling - Control techniques & information technology - Productivity & operations management - Overall & preventive control.

VII) **Cost Accounting & Control** - Introduction – Elements of Cost - Prime cost – Overheads – Factory cost – Total Cost – Selling price – Nature of cost – Types of cost – Process cost & Cost of production – Allocation of overhead – Control & accounting of material labour & overhead – Depreciation – Breakeven analysis – Breakeven chart.

VIII) **Budget & Budgetary Control** - Budget – Definition – Concept – Budgeting – Budgetary Control – Objectives of Budgets, Budgeting & budgetary Control. Advantages of Budget, Budgeting & Budgetary Control. Limitations of Budget – Types of Budget – Preparation of Budget – Budget as a means of planning, control & co-ordation – operation (working of budgetary control.

IX) **Marketing** - Introduction to marketing function – genesis of marketing the marketing concept – marketing management system – objectives – its interfaces with other functions in the organization.

X) **Marketing Research** - Meaning – Scope, Contributions – Limitations of marketing research – Profile of marketing research in India – Marketing research procedure – Types & techniques.

XI) **Financial Management** - Balance sheet – Profit loss statement – Financial ratio

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 – History of Development of Technical Textiles – present status and future of Technical Textiles – Areas of Application of Technical Textiles.

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

III) **Heat and Flame Protection Applications** – Flammability, thermal characteristics and combustion mechanisms of fibres, prevention of combustion – Flame retardant fibres suitable for protective clothing – Chemical modifications to make textile materials flame retardant.

IV) **Filtration Application** – Introduction – dust filtration – (Fabric construction – Finishing Treatments) Solid-liquid separation, liquid – liquid filteration.

V) **Medical Textiles** – Introduction – Non inplantable materials, Extra corporeal devices – Inplantable materials - Health care / hygiene products.

VI) **Textile Reinforced Composite Materials** – Introduction to composite materials – Textile reinforcement – Woven fabric reinforced composites – Knitted reinforcement – Braided reinforcement – Stiched fabrics.

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 Defense** – 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 – paper makers felt – synthetic turf and sports application – bearing and sealing materials –

civil engineering Applications – sound insulation – structural application – power transmission – parachute textiles – ropes, cordage and twines.

XI) **Narrow fabric production methods** - Application in Technical Textiles.

XII) Testing of 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.

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) **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, Needle felt backings, woven carpet. Woven Carpet Manufacture – Wilton weaving, shedding mechanism, Aximinster. Tufted Carpet Manufacture – Broadloom machinery, Hand tufting, Ancillary equipments Needle felt 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) **General**: - Hand / machine embroidered scarves, stoles, shawls,Madeups used in hospitals, etc. Textiles care labeling & Design aids.

Reference Books

1) Carpets : Back to Front, Textile Progress, Vol.19, No.3 by – L Cegielka MA, The Textile Inst. Publication
2) Textile Floor coverings by G.H. Crawshaw, Textile Progress, Vol.9, No.2, The Textile Inst. Publisher.
3) Interior Furnishings', Textile Progress, Vol.11, No.1, By Mortimer O.Shea, The Textile Inst. Publication
4) Interior Furnishing by Mortimer O.Shea, Textile Progress, Vol.11, No.1, The Textile Institute, Publication.
5) Textile Floor covering by G.H. Crawshaw, Textile Progress Vol.9, No.2, The Textile Institute, 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 nonwoven, non woven definition INDA & EDANA, Non woven manufacturing process, web making process

II) Dry process including carding, Garnetting & air laid, wet process, polymer extrusion.

III) **Web bonding process** – chemical bonding, thermal bonding, mechanical bonding, spun bonding.

IV) **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.

V) **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 – choice of fibre.

VI) **Mechanical bonded webs** – needle punched nonwovens, Application of needle punching, stitch bonded nonwoven – manufacturing process, applications.

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

VIII) **Chemical 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 nonwoven.

IX) **Thermal bonded nonwovens** – binder, binding fibres, binding powder, binding webs, methods of thermal bonding – Hot calendering, belt calendering, oven bonding, ultrasonic bonding, radiant heat bonding.

X) Melt blown nonwovens

XI) Economics of nonwovens

XII) Nonwovens for Geotextiles.

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

XIV) 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.

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

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

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

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

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

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

XXI) 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.

FINAL YEAR B. TEXT - SEMESTER-II

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

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 – Models of organizational behaviour – 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 behaviour

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 behaviour across cultures.

VIII) **Professional and Business Ethics** – Concept of professional / professionalism – Concept of ethics – Ethics and morals – Business ethics – Professional ethics – Need for professional and business ethics – Importance of ethics – Need for business to be ethical – Ethical dilemmas – Ethical problems in business – Ethics issues – How to make business ethical – Codes of business and professional ethics – Chief provisions of a professional code – Ethics training programs – Communicating ethical values – Role of professional bodies.

IX) **Business & Environment**- Meaning of business – Earlier business objectives – Changing concept and objectives of business – Professionalization – Business ethics – Social responsibility of business – The Indian situation – Meaning of environment – Business firm & its environment – Relationship between business firm and its capital 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 – The factories act 1948 – The payment of wages act 1936 – The minimum wages act 1948 – The workmen's compensation act 1923 – The industrial dispute act 1947 – 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)

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

Topic -

In the beginning of the semester, every student individually 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 Preparation and Presentation -

Students will collect the information on the above subjects and submit the report both soft and hard copy on the dates specified by the concerned faculty. The seminar report will be of minimum 15 pages. The spacing between the lines will be 1.5. The font size will be 12 point with New Times 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.

Term Work Marks –

Seminar Report	-	25 Marks
Presentation	-	25 Marks

FINAL YEAR B. TEXT - SEMESTER-II

8.7 DISSERTATION (TT/MMTT/TPE/TC)

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 dissertations. Project may be taken up by an individual or a group.

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

1) Fabrication of equipments / gadget.
2) Manufacturing of products, its testing and analysis.
3) Extensive survey of industrial practices.
4) A work on industrial problems and finding out remedial measures.
5) Experimental verification on principles used in textiles.
6) Extensive numerical analysis of some problem may be carried out using computer.

FORMAT OF THE PROJECT REPORT

The project report should be typed with 1.5 spacing on demi – size bond paper and in neatly bound form. The total number of typed pages should not be more than 70 and not less than 25. The project report should be written in the following format.

1) Title Sheet
2) Certificate
3) Acknowledgement
4) Content
5) Abstract
6) Introduction
7) Literature survey
8) Design of Experiment / Plan of Work.
9) Observations / Results.
10) Discussion of results and conclusion

11) References: These references should be given in the standard format as that of international technical journals.

12) Annexures, apparatus, etc if any.

Two copies of report should be submitted to the institute / department and one copy should remain with every student of the group.

Assessment of Dissertation Work:-

Term work of 50 marks are 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 in each of the spinning, weaving & processing disciplines will be conducting oral examination.

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	:	25 Marks
Oral Exam	:	50 Marks
Subject Total	:	175 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 properties of compressed air for pneumatic systems, advantages of compressed air.

III) Fluid conditioning elements – filter, lubricator, dryers, heat exchangers and pressure regulators.

IV) Study of control valves in pneumatics – Pressure control, direction control and flow control valves & special valves.

V) Air compressors – Terminology, Types and selection.

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

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

VIII) Maintenance and trouble shooting in pneumatic system.

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

X) ISO / JIC symbols for elements used in hydraulic systems.

XI) Fluid conditioning components – Strainers, filters, heat exchangers.

XII) Study of control valves used in hydraulic system, pressure control, direction control and flow control valves.

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

XIV) Study of actuators – Linear and rotary actuators in hydraulics.

XV) Hydraulic circuits and applications – Speed control, sequencing, counter balancing, study of systems in Textile machines.

XVI) Maintenance and troubleshooting in hydraulic systems.

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	:	25 Marks
Practical Exam	:	50 Marks
Subject Total	:	175 Marks

I) **Measurement:-** Introduction, Need of measurement, Methods of Measurement, International standards of Measurement - a) Line standards 3) 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) **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.

IV) **Comparators :-** Study of Mechanical, Electrical, Pneumatic, Optical comparators

V) **Surface Finish: -** Roughness, Wavyness, lay, methods of measuring roughness, Ra value, Rz value, RMS value, CLA value, ten point height methods. Instrument for measuring surface Texture, Profilometer.

VI) **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.

VII) **Interferometry: -** Principles, optical flat, Typical applications of optical flat.

VIII) **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.

IX) **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.

X) **Measurement of Spur Gears: -** Gear Geometry, Runout checking, pitch measurement, profile checking, tooth thickness measurement, lead checking.

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 organisation, 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 of isolation of vibration and noise - Materials 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 ENVIRONMENTAL ENGINEERING IN TEXTILES (TPE) (ELECTIVE-II)

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

I) Definition of environment, ecology, pollution.

II) Types of pollution of textiles & their effects of stages of textiles on environment.

III) General waste categorization.

IV) Effective pollution prevention programme.

V) Air Pollution

- Classification and properties of air pollutants.
- Sources of emission.
- Green house gases
- Behaviour and fate of air pollutants.
- Effects of air pollution on human health, vegetation, animals, materials and structures, atmosphere, soil water bodies.
- Air pollution laws and norms.
- Plume behaviour
- Analysis of air pollutants
- Control measures of gaseous pollutions.

VI) Air Pollution in Spinning, Classification of pollutants and their levels and the effects on human health.

VII) Air pollution in wet processing, sources of air pollution in wet processing, their levels and toxicity and effects on human health.

VIII) Norms of the lighting in textile industry.

IX) Optical pollution – causes, and remedies.

X) Different between sound and noise.

XI) Noise levels and their ill effects on human health of various processes including textile activities.

XII) What are the measure noise sources in textile industry, their levels and their ill effects.

XIII) Environmental impact assessment ISO-14000 series.

XIV) Water Pollution :-

- Sources of water, their nature and use pattern.

- Types of water pollutants and their effects

XV) Factors polluting water in textile wet processing in each unit operation like desizing, scouring, bleaching, dyeing, printing & finishing. The volume of waste generated and nature of the wastewater.

XVI) Effects of wet processing effluent parameters on the environment.

XVII) Basic processes of wastewater treatment.

XVIII) Basic factors to be considered for waste water or effluent treatment.

XIX) A typical design for effluent treatment plant to meet the norms laid down by Pollution Control Board.

XX) Measures to reduce the textile effluent quantity.

XXI) Measures suggest to improve the quality of the effluent generated either by substitution, eco-friendly processing etc.

XXII) Advancement – in the effluent treatment like reverse osmosis, plasma technology, removal of dissolved solids, removal of heavy metals etc.

Reference Books

1) Environmental pollution control engineering – C.S. Rao.
2) Best management practices for pollution prevention in the textile industry – Textiles committee, 1997.
3) Fundamentals of air pollution – Richard W. Boubel, D. Fox etal.
4) Environmental issues – technology options for textile industry – Book of papers published by R.B. Chavan et.al of IIT, New Delhi.
5) Ecology and textiles – V.A. Shenai.
6) Treatment of textile processing effluents – N. Manivaskan.
7) Water & effluents in textile mills – P.B. Jhala et.al. ATIRA.
8) Textiles energy and waste seminar – proceedings from textile institute, 1997.

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 (Eg. Kevlar, Nomex, Carbon, Ceramic, Optical, Poly Ethylene, PBO, Power Fibre) - Inorganic Fibres & Their Products, Asbestos, Boron Fibre, Ceramic Fibre, Glass Fibre, Metal Fibre, Heat Resistant Fibres & Steel Fibres

II) **Textiles for Filtration** - Introduction, Principles and some mathematical models of wet & dry filtrations. Characteristic, properties of fibres & fabrics.

Dust Filtration - General, Protective Masks, 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.

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** - Miscellaneous – Characteristic features of 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. Partridge, The Textile Inst. Publication.
9) The Thermal Insulation Properties of Fabrics Textile Progress, Vol.24, No.4, J.O. Ukponmwan, The Textile Inst. Publication.
10) Thermal Bonding of Non woven fabrics Textile Progress, Vol.26, No.2, The Textile Inst. Publication

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

I) **Introduction –** Aim and scope of readymade garment field with special reference to textile wet processing. Brief introduction to various departments in a garment export house. General overview of various fabric materials used in garment making.

II) **Garment processing-** Concept of pre garment stage and garment stage processing. Concept of garment finishing, general precaution to be taken during finishing of cotton, wool, silk, rayon, woven and knitted materials. Fabric and sewing thread selection, Process Sequence, Flow Chart

III) **Garment processing machines-** Pedal dyeing machines, winch dyeing machines, soft overflow dyeing machines, tumble dryers, relax dryers, table printing, garment flat bed printing machines with no. of printing stations, transfer printing, digital printing, washing machines.

IV) **Speciality Finishes on Garments** – Finishing of woven / knitted garments – Stoneless stone wash effects – mud wash, Ion wash, chalk wash etc. , various softening treatments, water resistant breathable finish, Bio polishing, Leathery Finish, Protective Finishes – Antimicrobial, Deodorizing etc., Functional Finishes – Cool finish, Thermocat finishes, Wrinkle free finishes.

V) **Wash down effects on Denim** - Stone Wash, Enzyme Wash, Combined enzyme and stone wash, acid wash, antique wash, ball blast, whiskering, Sand blast, Ice wash.

VI) **Laundering-** Objective, Laundering procedures for various fibre fabrics i.e. cotton & linen, woolen, silks and synthetics, various laundry equipments used in commercial laundering.

VII) **Functional Finishes –**Cool Finish (Snocool), Thermocat Finishing, UV Protective Finish, Peach Skin Effect, AquaTex Finish, Feather touch & ultra soft touch, Rubbery touch, Non-stick Teflon spray

VIII) **Stain Removal –** Object (with reference to garment processing), general procedure of stain removal. Classification of stains, Principles of stain removing. Classification of stain removers. Application techniques for stain removers, i) Local Application II) Bulk Application

IX) **Dry Cleaning –** General introduction, objective and principle of the dry cleaning process, dry cleaning chemicals, detailed description of dry cleaning operations (sequential steps)

X) **Printing -** Special print recipes for fashion & garments**.**

Khadi, Metallic, Floc, Plastizol, Reflective, Pearl, Fluorescent Printing, High Density Printing, Puff Printing, Foil Printing, Plastic Printing, Label Printing
Defects -

Garment defects, Pressing Defects, Packing Defects

List of Experiments

1. To identify various types of stains and their removal
2. Dyeing of garments with natural dyes
3. Printing of garments with reactive dyes
4. Printing of garments with pigments
5. Special printing on garments like Plastizol
6. Special printing on garments like Fluorescent Printing
7. Special printing on garments like pearl and metallic printing
8. Wrinkle free finishing of garment.
9. Permanent press finishing of garment
10. Softening treatments on garment.
11. Stiffening treatment on garment.
12. Soil release finishing.
13. Water repellant finishing.
14. Antimicrobial finishing on garment.
15. Bio-polishing treatment on garment.
16. Stone wash on garment.
17. Acid wash on garment.

Reference Books

1. Chemical after treatments of textile by Marks, Atlas & Wooding.
2. Textile finishing by A.J. Hall.
3. Introduction to textile finishing by J.T. Marsh.
4. Technology of finishing – Vol. X by Dr. V.A. Shenai.
5. Chemical processing of polyester/cellulosic blends by R.M. Mittal and S.S. Trivedi.
6. Silk dyeing, printing and finishing by Prof. M.L. Gulrajani.
7. Garment Finishing & Care Labelling byS.S.Satsangi, Usha Publishers,53-B/AC-IV, Shalimar Bagh, New Delhi.
8. Stain Removing Techniques by byS.S.Satsangi, Usha Publishers,53-B/AC-IV, Shalimar Bagh, New Delhi.
9. Fabric Care by Noemia D'SOUZA, New Age International Publishers, Daryagang, New Delhi.

FINAL YEAR B. TEXT - SEMESTER-II

8.2 ECOFRIENDLY PROCESSING & ENVIRONMENTAL MANAGEMENT (TC)

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

I) **Introduction to Eco System -** changes of eco system like carton cycle, Nitrogen cycle & phosphorus cycle, current eco system problems, Environmental problems and human health, Risk assessment and risk management, ecology and textiles, Toxicological considerations of textile processing.

II) **Eco-friendly Pretreatments** – Concept of enzymes, Classification of enzymes, Mode of action of enzyme, Factors affecting efficiency of enzyme treatment. Enzymatic desizing, Bio scouring, enzymatic degumming, enzymatic H_2O_2 bleaching, Eco-friendly peracetic acid bleaching, Eco-friendly retting of Jute & Linen, Redox H_2O_2 bleaching, Concept of Eco-friendly stabilizers for H_2O_2 bleaching.

III) **Eco-friendly dyes & dyeing** – Eco-friendly direct, reactive, vat, disperse dyes, Eco-friendly dyeing with sulphur & vat dyes, Low salt and No salt reactive dyeing, concept of natural dyes, classification & sources of natural dyes, Extraction and properties identification of some important natural dyes, Eco-friendly methods of mordanting and dyeing using natural dyes. Different methods of dyeing of cellulosics & synthetics with natural dyes. Super critical CO_2 dyeing, application of ultrasonic in textile wet processing.

IV) **Eco-friendly Finishing & Printing** – Bio polishing, Eco-friendly resin finishing, Plasma Technology; Preparation, Properties and application of plasma in finishing, Eco-friendly printing with respect to thickeners and auxiliaries used in pigment printing, Eco-friendly textile speciality chemicals and auxiliaries.

V) **Introduction to Environmental Management -** Definitions of environment, ecology, pollution, Types of pollution and effects of stages of textiles on environment, general waste categorization, effective pollution prevention programme, Testing of Effluents for various characteristics such as BOD, COD, Turbidity, TDS, SS, Grease, Oils. Types of textile effluents and their characteristics.

VI) **Effluent Treatments** - Methods of Treatment of Textile effluents – preliminary treatment – flocculation & coagulation – oxidation by bio-chemical methods, sedimentation – Filtration – Tertiary Treatment – sludge disposal – Analysis of effluents – Reuse of water –cost of effluent treatment, design of typical ETP.

VII) **Noise Pollution & Air Pollution in Textile Industry** - Noise Pollution and its control in Textile Industry – Introduction, Noise in Textile Industry – Effect of noise on human beings – measurement of noise – methods of reducing noise & vibration. Classification & properties of air pollutants, sources of emission, Green house gases, behaviour and fate of air pollutant, effect of air pollution on human health, vegetation, animals, materials & structures, Atmosphere, Soil, Water bodies. Air pollution laws and norms, Plum behaviour, Analysis of air pollutants, remedial measures of particulate matters, Control measures of gaseous pollutions.

VIII) **Other health hazards in Textile Industry** - Fire & accidents, Precautions required to be taken as per statutory regulations and existing practices. Practices of Industrial safety in Textile mills. Diseases, causes and remedies, occupational Health & safety management techniques of accumulation, energy planning.

IX) **Environmental Management System (ISO / 14000) -** Emergency of ISO - 14000 standard, environmental policy, EMS planning, Implementation, Checking of corrective action.

List of Experiments

1. Enzymatic desizing of cotton using normal and high temp enzymes.
2. Bio scouring of cotton fabric.
3. Enzymatic degumming of silk.
4. Enzymatic bleaching of cotton.
5. Eco-friendly sulphur dyeing.
6. Eco-friendly vat dyeing.
7. No salt reactive dyeing.
8. Eco-friendly peracetic acid bleaching.
9. Redox H_2O_2 bleaching.
10. Dyeing of cotton with natural dye.
11. Dyeing of wool with natural dye.
12. Dyeing of silk with natural dye.
13. Dyeing of synthetic with natural dye.
14. Eco-friendly bleaching of Jute & Linen.
15. Eco-friendly resin finishing of cotton.

16. Bio polishing of cotton fabric.
17. Ultra Sound Dyeing.

Reference Books

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

FINAL YEAR B. TEXT - SEMESTER-II

8.4 MANUFACTURE OF TECHNICAL TEXTILES (TC)

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

I) Polymeric materials for coating – rubber (natural and synthetic) – polyvinyl chloride – polyurethane – Acrylic polymers – Adhesive treatment – Radiation cure coatings.

II) Textile substrates for coated fabrics – materials and trends – Textile fibres – woven fabrics – knitted fabrics – Non-woven fabrics.

III) 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.

IV) Non apparel coating – synthetic leather – architectural textiles – fluid containers – tarpaulins – automotive air bag fabrics – carpet backing – textile foam laminates for automotive interiors.

V) 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.

VI) Military and Defence textiles – Introduction – protective clothing – textiles used in defence systems and weapons – other applications.

VII) 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.

VIII) Geotextiles – Introduction – geotextile materials – geotextile properties – geotextile functions – application & examples of geotextiles – geosynthetics.

IX) Filtration Textile – Introduction – Principles of filtration and equipments – textiles in dry filtration – textile in liquid filtration – finishing treatments – testing of filter fabric.

X) 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.

XI) Safety protective textiles and transportation 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.

XII) 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.

XIII) 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

XIV) 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 PROCESSING OF YARNS & SPECIALITY FABRICS (TC) (ELECTIVE-II)

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

I) **Processing of knit goods -** Concept of warp knits, wefy 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) **Silk -** Morphological and chemical structure of silk. Degumming and bleaching of silk. Dyeing and printing of silk. Mechanical and chemical finishing of silk.

VIII) **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.

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

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

8.5 MERCHANDISING (TC) (ELECTIVE-II)

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

I) **Apparel Industry profile -** Introduction to apparel industry - organization of the apparel industry types of exporters Business concepts applied to the apparel industry - International trade. Buyer classification and buying network in exports- A basic profile of industry in far east, USA, Europe, Australia and ECE- Understanding of the quota system.

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) **Fashion Merchandising -** Study of fashion principles, theories and fashion cycle and terminology- Introduction to fashion marketing and merchandizing principles – retail, whole sale, boutique, designer - wear, couture, pret-o-porter (ready to wear), haute couture (hi-fashion)-Study of domestic and international market – past, present and future scenario – evolution of fashion- Economic social, environmental and political influences on fashion

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.