

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

SR. NO.	COMMITTON 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

L =LECTURES

T =TUTORIALS

DR=DRAWING

PR=PRACTICALS

TP=THEORY PAPER

TW=TERM WORK

OE=ORAL EXAMINATION

PE=PRACTICAL XAMINATION

LIST OF ELECTIVE-I

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

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

SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION 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

L =LECTURES

T =TUTORIALS

DR=DRAWING

PR=PRACTICALS

TP=THEORY PAPER

TW=TERM WORK

OE=ORAL EXAMINATION

PE=PRACTICAL XAMINATION

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

7.5 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) Micromotion Study – Contribution of Gilbreth, Therbligs, Procedure, 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 – Samuel Eilon.
- 4) Industrial Engineering & Management – Banga Sharma.
- 5) Industrial Engineering & Management – O. P. Khanna.
- 6) Industrial Engineering Manual of Textile Industry – Nohert Lioyd Enrick.
- 7) Industrial & production engineering – Sanjay S. Patil, & Nandkumar Hukeri.

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, unbalanced stitching pucker 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 drawer, 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 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. Loblely.
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 Frigidon 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 collected 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

7.1 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, decatizing, 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 Oko-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, Ixtilite 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, Edited by P. W. Harrison, Textile Progress, Vol. 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° and 10° 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 fracture – 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 – heterocyclic polymers.
- VIII) Polymers with electrical and electronic properties – conducting polymers – conducting mechanisms – polyacetylene – poly paraphenylene – polypyrrole – 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, Elsevier, 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 Hyderabad.
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

8.3 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 – policies – 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-ordination – 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) Entrepreneurial 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

**8.5 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 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 & Keith 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 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 repellent 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 by S.S. Satsangi, Usha Publishers, 53-B/AC-IV, Shalimar Bagh, New Delhi.
8. Stain Removing Techniques by S.S. Satsangi, Usha Publishers, 53-B/AC-IV, Shalimar Bagh, New Delhi.
9. Fabric Care by Noemia D'SOUZA, New Age International Publishers, Daryaganj, 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 carbon 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 H₂O₂ bleaching, Eco-friendly peracetic acid bleaching, Eco-friendly retting of Jute & Linen, Redox H₂O₂ bleaching, Concept of Eco-friendly stabilizers for H₂O₂ 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 cellulose & synthetics with natural dyes. Super critical CO₂ 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 H₂O₂ 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, weft knits, courses, wales, stitch and loop density. Factors to be considered in knit processing, process sequences in tubular and open width form. Pretreatment like singeing, scouring, bleaching and mercerization. Dyeing with direct, reactive, vat and sulphur using winch and soft flow dyeing machines. Chemical and mechanical finishing. Shearing, raising, drying and compacting. Faults in knit goods.
- II) **Processing of Denim** - Introduction to denim, types of Denim fabrics, chemistry and process of warp dyeing with indigo. Indigo dyeing equipments. Dyeing with mixture of indigo and other dyes. Finishing of Denim Fabrics and Garments. Quality and process control in wet processing.
- III) **Terry towel** - Process sequence and machines used for terry towel manufacturing, essential properties of terry towel fabrics like pile properties, water absorbancy. Type and application of terry fabrics. Different stages of towel processing and finishing. Defects in terry fabrics.
- IV) **Carpet Processing** - Different fibres suitable for carpets, types of carpets, essential properties of carpet fabric. Dyeing and printing of carpets. Mechanical and chemical finishing of carpets.
- V) **Processing of Lyocell** - General properties and uses of lyocell (Tencel). Pretreatment, dyeing and finishing of lyocell. Concept of fibrillation, 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 woollen 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. Woollenisation 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 Floorcovering 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 Spandex 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, China.
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.