## M.TECH. TEXTILE TECHNOLOGY (WITH SPECIALIZATION IN TEXTILE CHEMISTRY)

### SEMESTER I

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OBJECTIVES

- To enable the students to study about the mechanism of Preparatory process
- To enable the students to study about elements of dye chemistry
- To enable the students to study about Printing methods & styles and the Necessity of Finishing

OUTCOMES

Upon completion of this course the student shall be able to know the mechanism

- Preparatory process & Elements of dye chemistry
- Printing methods, styles & Necessity of Finishing

UNIT I  DE-SIZING  9

UNIT II  BLEACHING  9

UNIT III  ELEMENTS OF DYE CHEMISTRY  9
Classification of dye stuffs according to their chemical constitution / structure and specific applications – VBT and MO Theory of colour - interaction of dye molecules with polymeric chains – Fick’s first and second Laws of diffusion – Adsorption theory – Study about natural dyes and their application to fibres like cotton, wool and silk.

UNIT IV  PRINTING  9

UNIT V  FINISHING  9

TOTAL: 45 PERIODS

REFERENCES
OBJECTIVES
- To enable the students to study about the essential properties of fabrics for clothing
- To enable the students to study about evaluation of essential properties of fabrics
- To enable the students to study the Design logic for Yarn, Fabric & Apparels.

OUTCOMES
Upon completion of this course the student shall be able to know
- The Various Properties of Fabrics & its Evaluation methods
- Design Logic for Yarn, Fabric & Apparels

UNIT I  DIMENSIONAL STABILITY
Hygral expansion - Relaxation shrinkage - Felting shrinkage - methods of measuring dimensional stability to dry cleaning and dry heat. serviceability: Snagging - Pilling - Abrasion resistance - Tearing strength - Tensile strength - Bursting strength - Corrosive strength - Launderability - Crock resistance - Flammability - Scorching - Fusing - Static electricity - Seam strength and slippage

UNIT II  COMFORT
Thermal comfort & conductivity - Air permeability - Water vapour permeability - moisture transport - wetting - wicking - sensorial comfort - water absorption - water repellency - oil repellency - soil resistance. aesthetics: Colour - colour fastness - shade variation - colour measurement

UNIT III  FABRIC HANDLE
Bending - Drape - Crease recovery - fabric thickness - Shear - Bias extension - formability - fabric friction - objective evaluation of fabric hand by KES and FAST

UNIT IV  INTRODUCTION TO DESIGN LOGIC OF TEXTILE PRODUCTS
Classification of textile products and components. yarn design: Material, technology, and specifications - yarn design elements - design based on structure and material properties fabric design: Material, technology, and specifications - Fabric design elements - design based on structure and material properties

UNIT V  DESIGN OF APPAREL FABRICS

TOTAL:45 PERIODS

REFERENCES
OBJECTIVES

- To enable the students to study about the advanced techniques in Preparatory process
- To enable the students to study Modern concepts in Dyeing, Finishing & Bio Processing
- To enable the students to study the about Energy Conservation & Pollution control in Textile wet processing

OUTCOMES

Upon completion of this course the student shall be able to know the

- Advanced techniques in Preparatory process
- Modern concepts in Dyeing, Finishing & Bio Processing
- Energy Conservation & Pollution control in Textile wet processing

UNIT I CHEMICAL PREPARATORY PROCESSES


UNIT II FINISHING

Detail study about micro encapsulation and its application in various finishing of textile materials – Finishing of technical textiles – Formaldehyde free crease recovery finishing. Problems and remedies in the flame retardant finishing of polyester and its blends considering eco friendliness

UNIT III DYEING

Developments in the application of direct, reactive, disperse dyes to textile materials using batch wise and continuous methods. Concept of Right First Time dyeing method and its application Developments in E controls dyeing m/c’s

UNIT IV ENERGY CONSERVATION AND POLLUTION CONTROL

Energy conservation steps in chemical processing - low wet pick-up techniques - causes and remedies for water and air pollution – Detail study about characteristic of textile effluent Developments in membrane techniques in the effluent treatment. Bio-technology in textile effluent treatment plants

UNIT V BIO-PROCESSING


REFERENCES


TOTAL: 45 PERIODS
TY7104
THEORY OF DYEING AND AUXILIARIES

OBJECTIVES
- To study about the various theories of dyeing
- To study about the surfactants, their types & action on Natural & Manmade fibres
- To study about chemistry of auxiliaries involved in colouration, Printing & finishing

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Various Theories of dyeing
- surfactants, their types & action
- chemistry of auxiliaries involved in colouration, Printing & finishing

UNIT I

UNIT II
Theory of dyeing for Direct Dyes Dyeing, Reactive dyes dyeing, Sulphur dyes dyeing, Vat dyes dyeing, Disperse dyes dyeing, Azoic Colors dyeing, Acid dyes dyeing, Metal complex dyes dyeing, Basic dyes Dyeing

UNIT III
Surfactants: General consideration, mode of action and classification of surfactants – cationic, anionic, nonionic and amphoteric surfactants. Auxiliaries associated with De-sizing, scouring, Bleaching of cellulosic fibres, Protein fibres and synthetic fibres.

UNIT IV
Auxiliaries associated with Dyeing with Direct Dyes, Reactive, Vat, Azoic colors, Sulphur dyes, Acid dyes, Metal complex dyes, Basic and Disperse dyes.

UNIT V
Auxiliaries associated with printing: Direct Style of Printing, Discharge style of Printing, Resist style of printing, Auxiliaries used in Resin Finishing, Stiff finishing, soft finishing, Water repellent, Water Proof, Flame retardant, Soil release.

TOTAL: 45 PERIODS

REFERENCES

TY7105
THEORY OF COLOUR AND COLOURISATION

OBJECTIVES
- To study about concept of colour vision & the measurement of colour
- To study about the influence of fibre structure on dyeing & various dyeing models
- To give basic idea about Application & importance of CCM

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Concept of colour vision & the measurement of colour
- The influence of fibre structure on dyeing & various dyeing models
- Application of Computer color matching
UNIT I  COLOUR AND COLOUR VISION  9
Definition of colour and its classification— Structure and function of the eye — Detail study about rods and cones.— Modeling the colour vision process — Tests for defective colour vision. Study about metamerism

UNIT II  MODERN MEASUREMENT OF COLOUR  9
Detail study about colour measuring instruments like Spectro-photometer — Color eye – Derivation of KM equation and its application. Colour difference equations and application

UNIT III  COMPUTER COLOUR MATCHING  9
Derivation the equation for Evaluation of depth and relative depth — Evaluation of fastness test results — Evaluation of whiteness and yellowness — Recipe formulation and correction. Development in CCM. Problem and solution to measure OBA treated materials

UNIT IV  THE INFLUENCE OF FIBRE STRUCTURE ON DYEING  9
Dyeing properties related to the inherent physical structure of the fibre— The relationship between preparation and the physical properties of man-made fibres — The interaction between dyes & fibre forming polymers. Methods to find out nature of bonding in dyes materials. Study about four types of adsorption isotherms

UNIT V  DYEING MODELS  9
Mechanisms of reactions of reactive groups – Kinetics of hydrolysation of reactive groups – Methods to avoid hydrolysation and to get better fixation. Methods to improve dyeability of textile materials such as crafting, cationisation, solvent treatment etc

TOTAL: 45 PERIODS

REFERENCES

TX7201  STATISTICS FOR TEXTILE ENGINEERING  L T P C
3 1 0 4

OBJECTIVES
To make the students to learn about the
• Probability distributions, sampling and testing of hypothesis
• Process control using charts and process capability
• Design of experiments for textile applications and
• Modeling the probabilistic phenomena.

OUTCOME
Upon completion of this course, the student shall be able to
• Design the experiment, conduct statistical tests and analyse the results to arrive at the conclusions
• Study the capability of process and control the process based on data available and
• Make decisions with minimum error from available data.
UNIT I  PROBABILITY DISTRIBUTION AND ESTIMATIONS  6
Applications of Binomial, Poisson, normal, t, exponential, chi-square, F and Weibull distributions in textile engineering; point estimates and interval estimations of the parameters of the distribution functions

UNIT II  HYPOTHESIS TESTING  18
Sampling distribution; significance tests applicable to textile parameters – normal test, t-test, chi-square test and F-test; p-Values; selection of sample size and significance levels with relevance to textile applications; acceptance sampling

UNIT III  ANALYSIS OF VARIANCE AND NON-PARAMETRIC TESTS  12
Analysis of variance for different models; non-parametric tests - sign test, rank test, concordance test

UNIT IV  PROCESS CONTROL AND CAPABILITY ANALYSIS  12
Control charts for variables and attributes - basis, development, interpretation, sensitizing rules, average run length; process capability analysis

UNIT V  DESIGN AND ANALYSIS OF EXPERIMENTS  12
2^n full-factorial designs; composite designs; robust designs; development of regression models, regression coefficients; adequacy test; process optimizations.

TOTAL :  60 PERIODS

REFERENCES

TY7111  PRODUCT DEVELOPMENT LAB  L T P C
0 0 3 2

OBJECTIVES

 To enable the students to know how to improve the absorbency, whiteness of fabric by various preparatory processes.
 To enable the students to know about the development of simultaneous dyeing & finishing process
 To enable the student to know about the Transfer printing process for Natural & Synthetics

OUTCOMES

Upon completion of this course the student shall be able to know about the

 Combined preparatory & Dyeing processes
 Eco friendly finishing processes
 Method of Transfer printing process for cotton & PET

LIST OF EXPERIMENTS

2. Solvent scouring of cotton fabric
5. Transfer printing of polyester
6. Transfer printing of Cotton
8. Dyeing of P/C blend using single bath method
9. Denim washing

LIST OF EQUIPMENTS REQUIRED

1. Dye Bath
2. Miniature Jigger
3. Miniature Winch
4. Miniature Kier
5. Padding Mangle
6. Vacuum ironing table & Suction Iron box
7. Steamer
8. Garment washing machine
9. High Temperature Dyeing Machine
10. Tumble Dryer

TY7201 ADVANCED FINISHING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES
- To study importance of finishing & various application techniques.
- To study about finishing chemicals & auxiliaries.
- To study about the evaluation of various finishes.

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Need for functional finishes
- Methods of application of finishes and its evaluation

UNIT I

UNIT II
Concept of Flame proof & flame retardancy.Concept of pyrolysis, Flame retardant finishes for cotton, Concept of waterproof and water repellent Finishes, Durable water repellent finishes on cotton, Mildew proof finishes and Rot proof finishing.

UNIT III

UNIT IV

UNIT V
Mechanism in the weight reduction of PET by using alkali; micro encapsulation techniques in finishing process, Detail study of the process to produce silk like Polyester. Felting of wool, Woolanisation of jute. Study about cationic, reactive and silicon emulsion softeners. Brief study about stiffening of textile materials

TOTAL: 45 PERIODS
REFERENCES

TY7202 ADVANCES IN PROCESSING MACHINERY
L T P C
3 0 0 3

OBJECTIVES
- To study about the line diagrams & principle of machineries involved in processing.
- To study about the automation & recent developments in the same.

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Principles of machineries involved in processing.
- Automation & recent developments in processing.

UNIT I
Advances in fiber dyeing machine - Advances in cheese dyeing machine- importance of winding in yarn dyeing— calculation of winding density— various yarn dyeing defects caused by cheese dyeing machine - detailed maintenance schedule for cheese dyeing machines.

UNIT II
Advances in Beam dyeing - Advances in soft flow dyeing machines, Advances in jet dyeing machines — Developments in jiggers, Continuous dyeing machineries & its developments— Various dyeing defects caused by the above machineries.

UNIT III
Hydro extractor, Rope opener RF dryer, Yarn dryer, Knitted fabric dryer, Hot flue dryer, Stenter & its type. Sanforising machine, Compacting machines, Beach finishing machines.

UNIT IV

UNIT V
Garment dyeing machines, Tumble dryer, Fusing machines, Backfilling machine, Impotence of maintenance of processing machineries, Machineries used for foam application. Preparation of screens for Rotary Printing machines.

TOTAL : 45 PERIODS

REFERENCES
3. Gokhale S.V & Dhingra A.K. maintenance in chemical processing department of textile mills, ATIRA. 1994,
OBJECTIVES

- To study about the Developments in garment dyeing processing
- To study about the various Finishing techniques in garment processing.

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Developments in garment dyeing processing
- Various Finishing techniques in garment processing.

UNIT I


UNIT II


UNIT III

Wash down effects, stone wash, Enzyme wash, Bio – polishing, Acid wash, sand blasting, leather finish, rubbery touch, feather touch, peach skin finish, ION wash, mud wash, chalk wash, easy care finishes, wrinkle free and wrinkle resistant finish, water repellent finish, UV protective garments, Anti – microbial (or) anti – bacterial inhibition finish, silicone softeners – dimensional stability of knit garments, ozone fading & anti – ozonisation, fire retardant finishes for garments, functional finishes for garments.

UNIT IV


UNIT V


TOTAL : 45 PERIODS

REFERENCES

3. NCUTE – Programme series, Finishing of Garments and Knits, held at Ichalkaranchi, IIT,Delhi.
OBJECTIVES

- To enable the students to know about the preparatory and Dyeing processes for natural & Manmade fibres in suitable machines
- To enable the students to know about the Printing process.

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Preparatory and Dyeing processes for natural & manmade fibres in suitable machines
- Printing process

LIST OF EXPERIMENTS

2. Bleaching of cotton fabric in laboratory using different machines.
3. Dyeing of cotton fabric in laboratory model jigger using reactive dyes to match a given sample
5. Dyeing of knitted cotton fabric in laboratory model winch using reactive dyes and to determine their fastness properties.
7. Pigment printing woven fabric using table screen printing and determine the appropriate fastness properties.
8. Dry cleaning for different types of fabric using Garment washing Machine

TOTAL: 45 PERIODS

LIST OF EQUIPMENTS REQUIRED

1. Dye Bath
2. Miniature Jigger
3. Miniature Winch
4. Miniature Kier
5. Padding Mangle (Manual & Pneumatic)
6. Soft flow Dyeing machine
7. Infra red dyeing machine
8. High Temperature Dyeing Machine
9. Tumble Dryer
10. Table screen printing machine
11. Steamer

OBJECTIVES

- To enable the students to know about the recent developments in textile printing machineries
- To enable the students to know about the Auxiliary chemicals used in Modern printing processes.

OUTCOMES

Upon completion of this course the student shall be able to know about the

- Recent developments in textile printing machineries
- Auxiliary chemicals used in Modern printing processes.
UNIT I
Computer aided design systems for textile printing - Recent developments in textile printing machinery including automation.

UNIT II
Developments in Digital printing - Developments in Photo printing and Blast printing with indigo.

UNIT III
Developments in Xerox printing and Laser printing for fancy effects.

UNIT IV
Developments in preparation of printing inks.

UNIT V
Developments in Auxiliary chemicals used in printing - Developments in post-printing operations.

TOTAL : 45 PERIODS

REFERENCES

TY7002 ENERGY MANAGEMENT IN TEXTILE INDUSTRY

OBJECTIVES
- To enable the students to know about the concept of energy management in Textile Industry
- To enable the students to know about the concept of energy consumption And conservation
- To enable the students to know about the Energy efficient equipment & application of Non conventional energy sources

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Concept of energy management in Textile Industry
- Concept of energy consumption and conservation
- Energy efficient equipment & application of Non conventional energy sources

UNIT I INTRODUCTION
Concept of energy management — need for energy conservation — global energy scenario with specific reference to India— Demand side management (DSM) — Role of energy service companies (ESCOs)

UNIT II ENERGY CONSUMPTION ANALYSIS
Textile machines — Ancillaries — Component wise consumption — Specific energy consumption (UKG) — Cost of energy Vs sales value of textile product.

UNIT III ENERGY CONSERVATION
Electrical and Thermal audit — Productive and ancillary machines — Preparatory, Spinning, Post spinning, Weaving and Wet processing machines — Ancillaries — Humidification / Air
conditioning, Lighting, Compressors and Boilers and Generators. Different types of fuels and then notes in energy conservation.

UNIT IV ENERGY EFFICIENT EQUIPMENT 9
Energy efficient equipment for various processing machines and ancillaries — economics with pay back period and Return on Investment (ROI). Energy instrumentation: Energy monitoring instruments — Analog, Digital and computerized instruments and measurement techniques — maintenance of instruments / equipment.

UNIT V APPLICATION OF NON CONVENTIONAL ENERGY SOURCES 9
Solar energy: different type of collectors — photovoltaic cells. Wind energy, Bio energy, environmental impact on energy and co-generation by using different techniques.

TOTAL : 45 PERIODS

REFERENCES

TY7003 NON WOVEN AND SPECIALITY TEXTILES

OBJECTIVES

- To enable the students to know about the methods of producing non woven fabrics
- To enable the students to know about the structure & application of non woven fabrics in industrial purposes

OUTCOMES

Upon completion of this course the student shall be able to know about the
- Methods of producing non woven fabrics
- The structure & application of non woven fabrics in industrial purposes


UNIT III Classification and Definition - Preparatory processes. Fabric Production - Conventional shuttle looms, Endless Tape Looms, Circular Hose Pipe looms. Shuttleless Looms - Catch thread and flat knitting edge looms; Multi colour Needle Jacquard looms.

UNIT IV Production of Industrial Tapes, Elastic Tapes, Zip fastener tapes; Woven and printed Laboratoryels. Stretch fabrics - classification and its production; Elastomeric stretch fabrics; Braided fabrics; - Tubular structures - Braiding Machine; Nets and Laces - Types and description of Lace Machines - Knitting of laces - Tricot Lace Machines. Flocked fabrics – The process of flocking.
UNIT V

TOTAL : 45 PERIODS

REFERENCES

TY7004 FABRIC MECHANICS AND PRINCIPLES OF FABRIC MANUFACTURING

OBJECTIVES
To enable the students to know about the
- Geometry of the different fabrics
- Parameters which affect the geometry of the fabric
- Effect of different way of weft pick up on geometry

OUTCOMES
Upon completion of this course the student shall be able to
- Identify the parameters for controlling of geometry of fabric
- Develop the theory for controlling the geometry of fabrics

UNIT I

UNIT II

UNIT III

UNIT IV
UNIT V  
Kinematics of sley driven by eccentric, crank, link and cam mechanisms—moment of inertia of sley - beat-up force - sley eccentricity—mechanics of beat-up - rotary beat-up. Drive: Requirement of clutch and brake for high speed weaving machines—timing diagram and mechanics of clutch and brake.

TOTAL : 45 PERIODS

REFERENCES

TY7005  
HIGH PERFORMANCE FIBRES  
L T P C  
3 0 0 3

OBJECTIVES
To enable the students to know about the
- Conventional fibre forming mechanism
- Need for high performance fibre and its application
- Production methodology for speciality fibres

OUTCOMES
Upon completion of this course the student shall be able to
- Modify the conventional spinning process to produce speciality
- Know about production and application of high performance fibres

UNIT I  
ADVANCED SPINNING TECHNOLOGY  
12
Advances in conventional fibre forming process; gel spinning; liquid crystal spinning; electrospinning

UNIT II  
HIGH PERFORMANCE FIBRES FOR INDUSTRIAL APPLICATIONS  
12
Manufacturing, properties and applications of glass fibres, basalt fibres; carbon fibres, high performance polyethylene fibres; ceramic fibres

UNIT III  
HIGH PERFORMANCE FIBRES FOR MEDICAL APPLICATIONS  
18
Manufacturing, properties and applications of alginate fibres; chitosan fibres; regenerated silk and wool protein fibres; synthetic biodegradable fibres

UNIT IV  
SPECIALITY FIBRES  
18
Hollow and profile fibres; blended and bi-component fibres; film fibres and functionalized fibres for specific applications; manufacturing, properties and applications of chemically and thermally resistant fibres

TOTAL : 45 PERIODS

REFERENCES
OBJECTIVES
To enable the students to know about the
- Various Preparatory processes for manmade textile
- Practical problems and their solutions in wet processing of manmade textiles

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Need for Preparatory processes of manmade textiles
- Method of application of dyes, print and finishes on manmade textiles.

UNIT I

UNIT II

UNIT III

UNIT IV
Printing of synthetic and blended fabrics with different dye classes - Direct, resist and discharge styles of printing - Transfer printing of polyester and blends.

UNIT V
Different functional and easy care finishes on synthetics and blends like anti-stat, soil-release, soil-resistant, flame-retardant.

REFERENCES
OBJECTIVES
To enable the students to know about the
- Various cost terminology and costing for manufacturing
- Purpose of cost allocation and inventory management

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Need for costing & process optimization
- Process optimization techniques in various textile departments

UNIT I
An Introduction to cost terms and purposes, cost terminology, direct and indirect costs, cost behavior patterns: variable costs & fixed costs, total costs and unit costs. Financial statements and inventory costs, types of inventory, production costs, prime costs and conversion costs, costing for manufacturing, merchandising and service sector companies.

UNIT II
Activity based costing and management, broad averaging via smooth or peanut — butter costing approaches, refining a cost system, costing hierarchies, comparison of alternate costing systems, using ABC system for cost management and profitability improvement - Activity based costing and department costing systems. Implementing ABC system.

UNIT III
Cost application and revenues, purpose of cost allocation, allocating cost from one department to another and support departments. Cost allocation of joint products and by products. Cost volume profit analysis, assumption, terminology, essentials of evp analysis, the break even point, target operative income and income taxes, cost planning and cvp - cvp analysis – service and non-profit organizations - effect of sales mix on income.

UNIT IV
Process costing, hybrid costing systems, operation costing, journal entries, spoilage rework and scrap costing - quality, time and theory of constraints - control charts - Pareto diagrams, cause and effect diagrams. Inventory management - Just in Time (JIT) and back flush.

UNIT V
Inventory costing and capacity analysis, standard costs, cost estimation approaches, activity based costing and cost estimation, non-linearity and cost function. Tools for planning and control, master budget and flexible budgets, the use of variances, flexible budget variances and sales volume variance, primary variance and efficiency for direct cost input, planning variable and fixed over head costs. Decision marketing and retrieving information, pricing decisions and cost management, target costs. Process optimization — methodology for spinning, weaving, knitting, chemical processing, garment making - case studies.

REFERENCES

TOTAL : 45 PERIODS
OBJECTIVES
To enable the students to know about the
- Various techniques in textile wet processing
- Theory and application of various instruments in textile
- Fabric geometry general terms for different types of knits

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Need for different types of chromatographic techniques
- Instruments to measure the various parameter of textiles.

UNIT I  CHROMATOGRAPHIC TECHNIQUES  9

UNIT II  SPECTROSCOPY & COLOURIMETRY  9
Theory, deviations from Beer's law, Instrumentation (Line diagram alone) - applications. Ultraviolet spectroscopy – Theory, Instrumentation & application. NMR spectroscopy – Quantum description, Instrumentation, chemical shift, applications & limitations.

UNIT III  INFRARED SPECTROSCOPY  9
Theory, fundamental vibrations, overtone, Hook's law, instrumentation, single & double beam spectrometers, application & limitations. Difference between Raman spectra and IR spectra. MASS SPECTROSCOPY: Theory, Interpretation, some examples, applications and limitations.

UNIT IV  INSTRUMENTATION SYSTEMS  9

UNIT V  CONTROL SYSTEM COMPONENTS  9
Stepper motors, hydraulic valves – Pneumatic switches, proximity switches & flapper valves – Programmable logic controllers (PLC) and their applications – Temperature controllers, pH meters – Control systems and components, used in Dyeing, Finishing, Drying and Printing machinery.

TOTAL : 45 PERIODS

REFERENCES
4. Gurdeep Chatwal, Anand “Instrumental Methods of Chemical Analysis”.
OBJECTIVES
To enable the students to know about the
- Pollution and its control in textile processing industries
- Application of bio technology in textile wet processing

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Identify the chemicals which cause pollution during wet processing of textiles and
- Replace the hazardous chemicals by Enzyme
- Create the Ecofriendly methods for textile wet processing.

UNIT I INDUSTRIAL BIO-TECHNOLOGY
Industrial microbial products – applications, primary metabolloids and secondary metabolloids, Enzymes & Proteins – sources and applications, cell and enzyme immobilization, Industrial plant products – production of enzymes and polysaccharides.

UNIT II ENVIRONMENTAL BIO-TECHNOLOGY
Detailed study about pollution and its control in textile processing industries. Waste water treatment systems – Anaerobic & Aerobic systems, Bio-degradation – Micro organism in pollution control; Bio mass production; waste as renewable sources of energy — Production of bio gas production of hydrocarbon – Hydrogen fuel.

UNIT III ENZYMES USED IN TEXTILE INDUSTRY

UNIT IV EVALUATION OF ENZYME TREATED FABRICS
Weight loss, Whiteness index, Absorbency, Tensile strength, Handle of fabric and Abrasion resistance. SEM analysis and other structure related studies.

UNIT V BIO – PROCESSING IN TEXTILES
Bio-bleaching, combined bio - processing, bio washing, bio polishing, Denim fading, anti odour and anti microbial finishes, bio finishing and other applications.

TOTAL : 45 PERIODS

REFERENCES
1. Betrabet S.M. BTRA Seminar, Book of papers (Jan 1994)
To enable the students to know about the buying behavior and market segmentation
To enable the students to know about Merchandising

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Concept of marketing management
- Buying behavior and market segmentation
- Concept of Merchandising

UNIT I MARKETING

UNIT II BUYING BEHAVIOUR
Factors influencing buying behaviour - Buying process segmentation: Market segmentation - segmentation variables - Target Marketing market measurement - Market Potential-estimation - Demand Forecasting - methods of forecasting

UNIT III MARKETING MIX
Product, Price - Promotion and Distribution - Advertising and Sales Promotion – Public Relations.

UNIT IV PRODUCT LIFE CYCLE
Life cycle of product - Marketing strategy for various stages of life cycle - new product development. marketing research: Purpose, Procedure and applications

UNIT V MERCHANDISING
Merchandise – definition - Apparel and Fashion Merchandising - Role of Merchandiser – Types of Merchandises - Export House, Manufacturer, Buying House, Buying Agency and Comparison between them - Selection of Buyers and Buying Agencies - Merchandising Correspondence - orders, handling of orders and dealing with manufacturers - Advertising - Trade fair participation and other methods of sales promotion in merchandising

TOTAL: 45 PERIODS

REFERENCES
2. Taarno, Guerreiro & Judelle “Inside the fashion business” 1995
3. “Clothing Retailing in Europe”, Corporate intelligence on retailing, 1997

TY7011 TECHNICAL TEXTILES L T P C 3 0 0 3

OBJECTIVES
- To enable the students to know about the concept, application & evaluation of technical textiles in various fields.
- To enable the students to know about finishing processes for technical textiles

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Concept, application & evaluation of technical textiles in various fields
- Finishing processes for technical textiles
UNIT I  FILTRATION TEXTILES  9
Theory of dust collection, cleaning systems, fabric selection for dust collection, finishing
treatments; solid, liquid separation, fabric selection - filtration, requirements, yarn and fabric
construction for filter fabrics, finishing treatments

UNIT II  GEO TEXTILES  4
Geo textiles – types, structures, manufacture, properties, evaluation, applications

UNIT III  DEFENCE AND PROTECTIVE TEXTILES  9
Thermal insulation materials; study of water vapour permeable / water proof materials,
military combat clothing systems; camouflage textiles, UV wave band, visible wave band,
visual decoys; infrared camouflage; protective textiles against micro organisms, chemicals
and pesticides, evaluation technique

UNIT IV  TRANSPORTATION TEXTILES  5
Fibre requirements—fibre, plastic composites; textiles applications in all kinds of road
transport vehicles, rail, aircrafts, marine

UNIT V  MEDICAL TEXTILES  9
Textile materials in medical applications; bandages and pressure garments; evaluation
technique; study of various kinds of wound care dressing and advanced wound dressings;
implantable and non implantable materials; study of sutures

UNIT VI  FINISHING AND COATING OF TECHNICAL TEXTILES  5
Mechanical finishes – types, machines; heat setting; chemical finishes - coating of technical
textiles, different techniques; fusible interlinings

UNIT VII  AGRO TEXTILES  4
Agricultural fabrics – construction details, properties, applications

TOTAL: 45 PERIODS

REFERENCES
   1-870812 – 44-1.
7. Anand S.C, Kennedy J.F., Miraftab M. and Rajendran S., “Medical textiles and
   85573-683-7.
   01351-7.
10. Allison Mathews and Martin Hardingham, “Medical and Hygiene Textile Production – A
12. Jurg Rupp, “Creating a garden with needle – punched fabrics”, Nonwovens and
OBJECTIVES
- To enable the students to know about the
- Need and types of composites
- Different techniques for producing composites
- Testing methods for composites

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Production methodology for composites
- Test and analyze the effect of fibre parameters on composite application

UNIT I INTRODUCTION

UNIT II COMPOSITE MATERIALS

UNIT III PREPREGS
Introduction to manufacturing techniques - property requirements — Textile preforms - weaving, knitting and braiding.

UNIT IV COMPOSITE MANUFACTURING TECHNOLOGY
Vacuum bagging - compression moulding — injection moulding - pultrusion – thermoforming filament winding - resin transfer moulding.

UNIT V PROPERTIES OF COMPOSITES

TOTAL : 45 PERIODS

REFERENCES
OBJECTIVES
To make the students to learn about the
• Fundamentals of experimental design and
• Selection of suitable design and analysis of the results.

OUTCOME
Upon completion of this course, the student shall be able to
• Design the experiment suitable for a given study and
• Conduct statistical tests and analyze the results to arrive at the conclusions.

UNIT I EXPERIMENTAL DESIGN FUNDAMENTALS 9
Importance of experiments, experimental strategies, basic principles of design, terminology, ANOVA, steps in experimentation, sample size, normal probability plot, linear regression model.

UNIT II SINGLE FACTOR EXPERIMENTS 9
Completely randomized design, Randomized block design, Latin square design. Statistical analysis, estimation of model parameters, model adequacy checking, pair wise comparison tests, in respect of textile process, machine and quality parameters.

UNIT III MULTIFACTOR EXPERIMENTS 9
Two and three factor full factorial experiments, $2^K$ factorial Experiments, Confounding and Blocking designs; application in textile experiments.

UNIT IV SPECIAL EXPERIMENTAL DESIGNS 9
Fractional factorial design, nested designs, Split plot design, Introduction to Response Surface Methodology, Experiments with random factors, rules for expected mean squares, approximate F- tests for textile applications.

UNIT V TAGUCHI METHODS 9
Steps in experimentation, design using Orthogonal Arrays, data analysis, Robust design-control and noise factors, S/N ratios, parameter design, case studies related to textile engineering.

TOTAL : 60 PERIODS

REFERENCES

TY7014 ADVANCED GARMENT MANUFACTURING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES
To enable the students to know about the
• Various body measurement and fabric cutting methods
• Different Classification of stitches and seams for garment manufacturing

OUTCOMES
Upon completion of this course the student shall be able to know about the
• Need for various pattern techniques
• Advanced technology and process for manufacturing of garment

UNIT I INTRODUCTION 9
Garment classification for men, women, children and uniforms - fabrics selection for garments - properties of fabric finishes (fundamental and decorative) - specifications and testing.

**UNIT II PATTERN MAKING**


**UNIT III STITCHING**

Classification of stitches and seams - lining – interlining - Sewing machine- Types and applications - parts and their function of a sewing machine - timed sequence for stitch formation - sewing aids – bobbin winding - stitch length selection - feed pressure - stitch patterns – Types and Selection of sewing threads.

**UNIT IV GARMENT PROCESSING**


**UNIT V GARMENT FINISHING**

Light finishing - pre-cure, post cure, and two stage resin finishing techniques - heat treatment - Printing of Garments: STP Technique - Printing equipments. Production and processing of heavy weight garments like denim, gabardine

**TOTAL : 45 PERIODS**

**REFERENCES**

7. New Wave in garment exports, Garment Processing, ATIRA Proceedings, June 1990

**TY7015 TEXTILE INDUSTRY MANAGEMENT**

**OBJECTIVES**

To enable the students to know about the
- Management task of HRD
- Tools and techniques for team work
- Job evaluation and job description in textile mills

**OUTCOMES**

Upon completion of this course the student shall be able to know about the
- Need for team work in the organization
- Job evaluation and job description in textile mills

**UNIT I**

HRD: Management task of HRD – Social interest and relevance – Improving the working conditions (case studies) – Improving productivity (case studies) – Attention to human needs (case studies) – Role of personnel manager – Selection process – Induction process – Personnel appraisal – Reward systems – Training programmes (Case studies) – Role of HRD manager.
UNIT II 9
Tools and techniques – Motivation of workers – Customer focus-emphasis on team work – Emphasis on competitive spirit – concepts of quality circles – Improvement in performance of the company and quality of group behaviour through quality circles - decision making process – Approach to TQM in Textile Industry (Case studies) Facing internal and external competition (case studies) – work culture change through TQM – Top management perspective – Accomplishment of objectives.

UNIT III 9

UNIT IV 9

UNIT V 9

TOTAL : 45 PERIODS

REFERENCES
6. Textile Machinery Maintenance – SITRA, 1999

TY7016 ADVANCED KNITTING TECHNOLOGIES L T P C 3 0 0 3

OBJECTIVES
To enable the students to know about the
- Classification of knitted fabric
- Machines and techniques for producing different knits
- Fabric geometry general terms for different types of knits

OUTCOMES
Upon completion of this course the student shall be able to know about the
- Need for different types of knits and its production
- Patternning devices for producing knits

UNIT I KNITTING STRUCTURES 9
UNIT II  KNITTING MACHINES  9
Classification – Weft knitting and warp knitting – comparison – circular – flat – straight bar –
compound needle, jack raising cam – stitch cam – counter cam – Guard cam timing
diagrams – elements of cam design.

UNIT III  PROPERTIES OF KNITTED STRUCTURES  9
Fabric geometry general terms – stitch density – representation of weft knitted structures –
representation of warp knitted structures – comparison of single knit and double knit
structures –
stitches and their properties – properties of Rib and interlock structures and comparison of
other structures – Spirality and other defects of knitted structures – tightness factor.

UNIT IV  KNITTING CYCLE  9
Single jersey m/c; Double jersey m/c- plain and Jacquard m/c, Purl m/c, single and double
bed flat knitting machine, single and double straight bar m/c, tricot, raschel & simplex m/c –
passage of materials and knitting action and mechanism of operation. Patterning Devices –
Principles of selection – effect of positive yarn feeding mechanism – autostop motions –
fabric take up mechanism, patterning in weft and warp knitting – pattern needles and chain
links – tension control – relation between loop length and construction – fabric relaxation and
shrinkage.

UNIT V  KNITTING DYNAMICS & SPECIAL KNITS  9
Mathematical analysis of yarn tension and forces involved – effect of cam shape – increase
in number of feeder – increase in linear speed – needle breakages and their control.
Elastomeric yarn knitting and pile knitting. Modern Techniques Of Knit Processing –
Advances in chemical processing of knits

REFERENCES
3. Raz., S., Flat Knitting, The Generation,, Meisenbach GMBH Hainstrasse 18, D-8600,
Bamberg/Germany (1991)
4. Raz., S., Flat Knitting, Universal Maschinenfabrick, Flachstrick-maschinen, D-73641,
Westhausen, Germany, (1993).
5. Iyer.C Bernd.M, Wolfgang,S, Circular Knitting”, Meisenbach GMBH Hainstrasse 18, D-
8600, Bamberg/Germany, 1995.

TOTAL : 45 PERIODS