TEXTILE TECHNOLOGY –SYLLABUS

SECTION 1.

Engineering Mathematics

Linear Algebra: Matrices and Determinants, Systems of linear equations, Eigen values and Eigen vectors.

Calculus : Limit continuity and differentiability; Partial Derivatives; Maxima and Minima; Sequences and series ; Test for convergence ; Fourier series

Vector Calculus : Gradient ;Divergence and Curl ; Line a; Surface and volume integrals ; Stokes ,Gauss and Green's theorems

Differential Equations : Linear and non-linear first order ODE's; Higher order linear ODE's with constant coefficients ;Cauchy's and Euler's equations ; Laplace transforms; PDE's- Laplace ,heat and wave equations.

Probability and Statistics : Mean , median, mode and standard deviation ; Ransom variable; Poisson , normal and binomial distributions ; Correlation and regression analysis.

Numerical Methods: Solutions of linear and non-linear algebraic equations ; integration of trapezoidal and Simpson's rule ; single and multi-step methods for differential equations.

SECTION 2.

General Textile Technology

Textile Fibres: Classification of textile fibres, fibre properties ,Substrate & Geometry, Spinning of Man Made fibres and terms related, Advances in Spinning Methods and Systems, spinnerets, spin finishes, properties of cotton, wool, silk and bast fibres, Surface modification of Natural and synthetic fibres, special reference to weight reduction of Polyester – commercial significance , role of synthetic fibres in Industrial textiles , Blend identification, brief note on Silk technology and types of silk yarns, types of silk fabrics, Types of yarn (single, multi fold & Fancy) , new fibres of Natural and Synthetic and their uses. Brief Note on Jute, Linen, Modal Fibres and their blends.

Yarn Count systems: Yarn Numbering systems, differences, conversion from one system to other

Textile Testing: objectives, number of sample and sample preparation methods, Testing of fibres, yarns & fabrics for various properties, use of test like CDT and Molecular eight, interpretation of results using statistics, Types of subjective tests and their selection, interpretation, Construction of Quality control, Snake, Radar or Polar charts and Ellipse charts, role of SHF, KESF, FAST, AFIS systems, analysis of KES-F data. Test for various applications of Textiles – Apparal, Industrial Fabrics, Technical Textiles, Functional Textiles.

SECTION 3.

Yarn Manufacture :

Blow Room : Developments in Cotton Ginning, contamination in cotton and methods to reduce contamination, role of fibre properties in Cotton selection , Mixing and Blending , selection of openers and cleaners , parameters controlling quality ,Modern developments in openers and Blow room,

Quality control studies in Blow room, Numerical examples on Production.

Carding and Drawing : various zones of carding and Objectives , elements , role played , setting , modern developments in Card and , Drawframe, quality control aspects, Autolevellers in Card and Drawframe, Numerical examples on Production

Comber and Simplex: Preparatory process to combing, selection of machines, quality control at comber ; Simplex Objectives and principles , Elements - Role played , setting , modern developments and quality control , Role of break draft at simplex., Numerical examples on Production

Ring Frame and Post spinning : Objectives and principles , role of elements and selection of break draft at ring frame, setting , modern developments and quality control in Ring spinning; post spinning machines and their selection.

Spin Plan : preparation of spin plan for cotton, blends and synthetics

Advanced yarn Manufacture : principles of open end spinning, selection criterion, elements and working of Rotor, DREF, CSIRO, and Airjet spinning

Yarn Engineering : Relation between yarn diameter and twist angle, energy stored in fibre or yarn, Number of fibres per cross section, fibre arrangement , Yarn contraction and retraction factors, fibre migration .

Texturing : Principles and methods of texturing ,Draw texturing and its parameters effect on DTY, application , precautions for Textured yarn weaving, quality control aspects of Textured yarn.

SECTION 4.

Fabric Manufacture :

Winding :types of spinning packages , principles of winding , selection criterion , systems of yarn preparation, various elements of winding machine and their selection , level of tension and yarn clearing , practical aspects, role of splicing and splicing systems ,kinetics of winding , recent developments in winding , productivity of winding , quality control aspects and production planning

Warping : types of warping, selection criterion, types of creels and their choice, practical aspects, practical aspects of sectional warping , recent developments in Warping (Beam and Sectional)productivity , quality control aspects and production planning.

Sizing : different methods of types of Sizing , elements of sizing machine , Size preparation and devices , Size ingredients and selection , calculation of concentration of size recipe, Quality control aspects , role of each zone, productivity of winding , quality control aspects and production planning

Post sizing : selection of heald, reed and drop wire and their selection.

Pirn Winding : Need and methods, types of pirn winders, role of Go and No Go gauges, Quality control aspects and production calculations.

Loom shed : Introduction to Weaving, Loom specification and Loom(Shuttle)classification and elements and mechanisms, quality control and production aspects, Loom primary and secondary motions ,shedding devices and sheds, Automatic weaving , Dobby and Jacquard shedding , box motions , practical aspects and problems, Timing of looms , Need for automatic weaving , mechanisms and setting of cop change mechanism, setting of looms for different types of fibres and sorts, cloth wind up systems

Unconventional weaving : principles of high speed weft insertion , selection criterion, Selvedges and types , selection , yarn preparatory requirements for modern weaving, weft accumulators and their selection , selection of healds, Reeds and drop wires , reworking elements of Gripper projectile, Rapier, Airjet ,Waterjet weaving , Circular looms, ,multiphase weaving, triaxial weaving , types of shedding, beating , takeup , letoff motions, types of temples, batching systems , type of heald crossing motion in shuttles looms and Cyclops.Techno-economics of modern weaving,

SECTION 5.

Fabric structure , Knitting , Nonwovens and Textile wet Processing

FABRIC STRUCTURE : elements of fabric structure and their inter relations , representation, primary , secondary and special weaves, Introduction to semi compound and compound structures , role of RTP and its selection, Beaming and Drafting , Construction of structures like Bedford cords, Pique, Extra thread figuring , backed cloths, Double cloths, Treble cloths, Weft piles, Terry piles , Gauze and Leno, Damask and Brochade, Loom arrangements to produce these advanced structures , uses.

KNITTING

Weft Knitting :Principles of loop formation in latch , beard and compound needle in weft knitting , various elements of circular weft knit machine, machine arrangement for rib, purl and interlock, methods of representation of knit structure , patterning in weft knitting , Knit geometry , role of starfish project, spirality and its measurements , quality control aspects, uses of weft knits, calculations in weft knitting

Warp Knitting : Various elements of warp knitting machine and their selection ,Principles of loop formation in latch , beard and compound needle, patterning in warp knitting , Knit geometry , Role of Run-In ratio and its estimations, quality control aspects , One bar and two bar structures, calculations in warp knitting , Yarn preparatory for warp knitting

TECHNOLOGY OF NONWOVEN FABRICS: differences between woven, knitted and nonwoven , methods of nonwoven, different types of fibres in nonwoven production, various aspects of dry and wet web preparation, cross lapper , selection, production of needle punched nonwoven , properties and applications

FABRIC ENGINEERING

Pierce Woven fabric geometry and different models , fabric GSM calculation , Cover factor and theories of cover factor,

SECTION 6.

TEXTILE WET PROCESSING

Grey cloth inspection, method of water calculation , elements, process and parameters of singeing ,

desizing , scouring , bleaching , mercerizing and quality control aspects, Introduction to dyeing and classification of dyes , selection of dyes in relation to fibre , substrate and geometry , dyeing and elements of dyeing and theories of dyeing , dyes and classification, dyeing methods , Different types of Dyeing machines and their selection, recent developments in Dyeing , faults of dyeing, printing and its elements , methods of printing , print paste preparation and elements of print paste , role played by each element, printing machines , selection of printing methods.

Finishes – need, importance, classification finishing elements and methods , types of finishes and machines used evaluation methods for various finishes – UV Protective finishes, flame retardant finishes etc., Importance of Nano finishes, Micro Encapsulated finishes. Denim finishes – latest advances. Special reference to heat setting of fabrics, types of stenters, concept of Effluent treatment of textile water and methods of purification of effluent and recent methods in ETP

APPAREL TECHNOLOGY

Fabric Inspection : Methods of inspection and their selection ,

Merchandizing : Functions of Merchandizing manager, concepts of Visual merchandizing.

Sourcing : Need, Scope, role played by Sourcing manager, Supplier selection, Rating and Development: Need, Types of Suppliers, Supply chain , methods of Supplier selection, evaluation , rating and development

Apparel Designing : Tools for Apparel designing, Preparation for measuring, Introduction to paper patterns , Introduction to drafting, Draping, Size chart formulation, concepts of Mens and Womens wear, Kids wear, Computer pattern grading, Pattern designing and grading, Parameters tables , Computer digitizing , Pattern design procedures, Production patterns, Pattern modification for garment size and fit:

CAD: Role of Garment CAD and types of software used in Apparel industry

Markers & Marker Planning: Need and scope of Markers, types, Marker making Methods (Manual and Automated), constraints on fabric width, checks and stripes, constraints on grain direction and factors effecting Marker efficiency and utilisation.

Spreading : Need, Objectives, requirements and methods of spreading, economic cut quantities, factors affecting economic cut quantities, computerized cut order planning

Cutting: Objectives, methods of cutting, Types of cutting machines and applications, study on computer controlled cutting machine, Role of CNC machines in cutting, Laser, water Jet and Plasma cutting. Stickering, Bundling, Dispatch

Sewing technology: Introduction to sewing machines, Types, Sewing Machine- components and functions of sewing machine. Embroidery machines – mechanism, stitch formation, Computer controlled embroidery sewing machine. Selection of Stitches & Stitching Mechanism: classification, Comparison of stitches and Its usage. Seams: definition, types of seams, Seam Finishes

Sewing threads: types, selection of sewing threads, sewing problems. Sewing thread consumption, work aids.

Fusing technology: Need, methods, requirement of fusing process, factors effecting fusing technology. Fusing machinery. quality control in fusing. Pressing of garment and equipment.

Washing: Types, principles of laundering, different methods of washing, characteristics of washing

machine

Garment Accessories & Embellishments, Garment Care : Care Labeling Need , types of care labels, information on care labels, Types and characteristics of stains, Identification of stains, selection of stain removers, methods of stain removal, principles of laundering, different methods of washing. Washing machines - friction, suction and tumble wash.

Documentation and control of material usage: Introduction, fabric usage control, issue of materials, spreading audit, fabric reconciliation, fabric faults and claims for poor quality, documentation – domestic and export, letter of credit.

Management of commodities: Introduction, Purchase Vs Procurement, relevant purchasing techniques and methods, Purchase procedure, Credit and discount in purchasing, coordination with production schedules, progress chasing, usage of commodities. Aspects related to preparation of Bill of Materials and Time and Action Plan.

Packing : Types of packing , role of Operations research in Apparel technology, new methods in packing tec hnology.

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