



Syllabus for Govt. Polytechnic (Diploma Sector)
Post : Lecturer Footwear Technology
PAPER-I

UNIT-I

INTRODUCTION TO LEATHER TECHNOLOGY

Various fibrous and non fibrous proteins, Non proteinous skin components. General physical and chemistry of proteins. Chemical constitution of hides and skins. Reaction of proteins with acids, bases and salts.

Primary structure of collagen, effect of enzymes on collagen.

Keratin, Reticulin, Elastin, histology of hides and skins-cell, tissue, fibers, muscles, glands, epidermics, pretanning process-soaking, liming, deliming, bating, degreasing, pickling & depickling.

Concept of tanning and leather, leather properties dependent on tanning, Vegetable tannins and vegetable tanning, classification of vegetable tannins, vegetable tanning materials and their properties, hydrolysable and condensed tannins, Mechanism of vegetable tanning, process of vegetable tanning, synthetic tannins, chrome complexes and their structures, method of chrome tanning, preparation of chrome liquors & Powders, mechanism of chrome tannage. Study of Aluminum, Zirconium, Iron, Titanium, Sodium silicate & Polyphosphates. Theory of neutralization, Combination tannages.

Principle of color chemistry, classification of leather dyes, color matching, theory and mechanism of dyeing, oils, fats, classification and types of leather finishes, pigments, binders, intro cellulose lacquers, wax emulsions, silicon emulsion.

Tannery effluents, effluent disposal, leather machinery-different machine used in leather processing. Anatomy of human foot, closing, making of footwear, classification of leather goods, method and material for construction.

UNIT-II

TESTING AND QUALITY CONTROL

Chemical analysis of pelts and Leathers: Principles and methods of analysis of limed and pickled pelt, chemical testing of vegetable tanned/chrome tanned/aluminum tanned/zirconium tanned/ formaldehyde tanned, combination tanned leathers.

Physical Testing of Leather: Sampling position for physical testing of leather. Different methods employ for physical testing of leather.

Principle involved in Static and Dynamic methods of non destructive testing of leathers. Different methods in testing of colour fastness of leathers.

Standards and quality Control: Quality control in leather processing, Rectification of defects in hides, Skin and Leathers, control of yield, color and finish of leather etc. Physical and chemical characteristics (standard specifications) of various types of leathers.

Analysis of Footwear and Leather Product.

UNIT-III

LEATHER PRODUCTS TECHNOLOGY

Overview: Classification of leather Goods & Garments. Selection of materials Grading and assorting of Leathers for Leather Goods & Garments. Property Requirement for Leather and Lining materials, Accessories for leather Goods and garments.

Cutting: Hand and Machine Cutting, Pattern interlocking, various types of assembly Techniques, skiving, splitting, folding, Sewing Quality Control measures in Leather products manufacture.

Machinery needs for Leather Goods Manufacture, Various types of Sewing machines-Flat Bed, Post Bed, Clicking, Splitting, Skiving, folding, embossing.

General information about Sports Goods, Harness & Saddlery Industry. Classification of Leather Based Sports Goods like Football, Hockey Ball, Cricket Ball, Sports Gloves, Wicket keeping Gloves, Sports Goods Bags.

Harness and Saddlery such as jumping, riding, racing, reins, Halters, Bridles Stirrups, Noseband, Martingales. Special types of leathers manufactured for sports goods, Harness and Saddlery and their Characteristics.

Organisation & Management: Project feasibility Reports, costing and pricing for leather goods & garments. Total Quality management. Analysis of International market trends.

UNIT-IV

MATERIAL OF FOOTWEAR MANUFACTURE

- 1. LEATHER:** Upper material (Natural and Man made) Different types of leather, used in shoe manufacturing, their characteristics and properties.
- 2. FABRIC:** Classification, fabrics used for upper lining, side lining, backer, taping, Socking, toe puff and their characteristics, use of elastic in footwear.
- 3. RUBBER:** (Soling Material/Sole) Utility of rubber in shoe industry and types of rubber used in footwear and their identification, characteristics, rubber sole, crepe sole, moulded rubber sole microcellulose, rubber sole, synthetic and resin rubber soles, Rubber compounding, mixing and vulcanization. Polymers.
- 4. FIBRE BOARD:** Different types of fiber board, Classification of leather board, characteristics of different types of leather boards for insole, stiffener toe puff and heel. Utility and use of paperboard; different types of paper board. Insole and types of materials.
- 5. SYNTHETIC MATERIAL:** PVC, PU, TPR poromerics, EVA and Filon materials, their properties and uses.
- 6. WOOD AND METAL:** Wooden and metallic heels, platform logs and shanks : Types of wood and metal used and their characteristics.
- 7. ADHESIVES:** Types of adhesives, basic materials used in formulation of adhesives like starch glue, latex, rubber solution, chloroprene based adhesive polyurethane, reoprere etc. Bonding strength of adhesives, time of setting comparative study of adhesives available in the market. Selection of adhesives for cemented construction.
- 8. GRINDERIES, SOLE AND SOLING MATERIALS:** Eyelets, rivets, hob nails of different heads, pinel pins, tingles made of different metals like iron, brass and their suitability and longevity. Special type of rivets used in selective type of footwear, brass screw, brass and steel staple and their use in footwear spikes used in sport shoes, shank, still toe cap and their use in special type of footwear, bottom - filling, materials like cement, elastics laces, EVA, Cork sheet, Saw Dust leather waste. Padding materials decorative fittings for footwear, different types of threads used in footwear manufacturing, Types of Niddles.
- 9. FINISHING MATERIALS:** Creams and waxes of different varieties and their use in formulation of finishing materials like sole polish, heel hand ball, upper dressings, polishes and creams of different colours. Glazing materials, lacquers, binders, resins, plasticizers etc. Material used in the formulation of glazing material such as rosin, sundras, shellac and the solvents required for their preparation.

UNIT-V

FUNDAMENTAL OF FOOTWEAR TECHNOLOGY AND FOOTWEAR DESIGN

FOOTWEAR MATERIALS AND COMPONENTS: Different types of upper and lining leathers; Different types of soling materials; Different types of adhesives used in footwear industry; Kinds of insole boards, Grinderies; Fasteners; Shoe dressing materials etc.

DESIGN AND PATTERN DEVELOPMENT: History of shoe; Purposes and styles; Fashion & designs; Preparation of standards and section for men, ladies & children; Classic and other types of shoes and boots.

CUTTING, PRE-CLOSING AND CLOSING: Principles of cutting – Hand, machine; Clicking room design and management. Checking incoming work, stitch making, skiving, punching and gimping, heat embossing, flow moulding, toe puff attachment, attaching linings and scrim, trimming linings, finishing off closed seams. Top line and other edge treatments, local reinforcements, attaching fasteners and trims

PRELASTING AND LASTING: Principles and methods of pre-lasting and lasting for different types of construction; Sole attaching; Lasted margin; Upper preparation; Sole preparation; Sole cementing; Upper 76 cementing; Bottom fillers and shanks; Adhesive drying, Heat activation, Spotting, Pressing, Last slipping, Health and safety, Quality control and fault finding problems- solving.

METHODS OF SHOE CONSTRUCTION: Various methods of shoe construction; shoe room techniques.

ANATOMY OF HUMAN FOOT: Bones, Joints, Arches, Ligaments, Skin.

FOOT DISEASES AND ABNORMALITIES.

FOOT MEASUREMENT AND INTERNATIONAL SIZE SYSTEM.

LAST.

Syllabus for Govt. Polytechnic (Diploma Sector)
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PAPER-II

UNIT-I

SELECTION OF SITE, FOOTWEAR AND LEATHER GOODS MACHINERY

1. **Selection of Site:** Location of footwear and leather goods manufacturing units. Factors influencing site selection such as availability of power, transport, market, labour, raw materials.

2. **Footwear and Leather Goods Machinery:** General construction, descriptive idea of various footwear and leather goods machinery such as

- (a) Pattern making machine
- (b) Hand press
- (c) Upper and bottom clicking press (Hydraulic/Pneumatic)
- (d) Belt cutting machine
- (e) Upper and bottom splitting machine
- (f) Skiving machine
- (g) Folding machine
- (h) Industrial sewing machine (flat bed, cylinder bed, post bed, heavy duty, zigzag)
- (i) Punching and eyeletting machine
- (j) Trade mark embossing machine
- (k) Fore part lasting m/c
- (l) Side lasting machine
- (m) Seat lasting veldschoen
- (n) Upper roughing machine
- (o) Bottom roughing machine
- (p) Cementing press
- (q) Pounding machine
- (r) Sole screwing machine
- (s) Sole & heel trimming machine
- (t) Combined finishing machine
- (u) Spray booth with compressor
- (v) Heel attaching machine
- (w) Double operating Press (D.O.P. machine)
- (x) Double needle stitching machine
- (y) Lasting machine (To & side lasting machine)
- (z) Sole Press M/c (Hydraulic/Pneumatic), Heat Setter and Chiller

3. Footwear Plant Maintenance:

- (a) Functions of maintenance department
 - (b) Maintenance procedures - preventive maintenance, Routine maintenance and breakdown maintenance of footwear and Leather goods machineries and accessories.
 - (c) Lubrication and oiling procedures in routine maintenance and development lubrication charts.
 - (d) Fabrication and repair of components for breakdown maintenance.
 - (e) Estimating the repair and maintenance cost.
 - (f) Safety - Definition, importance, causes of accident, accident prevention rules, general safety devices.
4. Selection of machinery for different capacities of production, conveyor system of working in upper making and assembly.

UNIT-II

CONCEPT OF FOOTWEAR TECHNOLOGY

1. A historical review of the footwear industry and its impact and importance in modern life particularly in relation to all type of gents, ladies and children shoes of every day use. Modern trends and development in foreign countries. Purpose of shoes in every day life.
2. Machines and tools employed in the upper and bottom clicking departments.
3. **Various stages of footwear manufacture as:** Upper clicking : Principles of clicking, marking and cutting of paper patterns and leather components of shapes, design tightness strength, uniformity, economy and control of material consumption. Condition of knife, way of cutting, planning of cutting arrangements, inter-locking locking continuity when cutting, over cutting, identification, marking and correct pairing. Cutting of fabrics by different system i.e. wrap system, welt system and bias system of cutting and lining marking. Advantages and disadvantages of Hand and press clicking. Qualities of a good clicker.
4. Introduction to constructions such as Good year welted, silhou welt Lock stitch through sewn welt, fair-stitched, moccasin machine sewn (Black or Mekay) cemented riveted screwd and stitched, turnshoe, veldschoen, sliplasted, direct moulded construction, injection moulding; DVP, DMS. Strobel construction, Machine strobel construction, Stitch down constant.
5. Bottom cutting and preparation of bottom stock Correct placing of cutting knives in accordance with their requirements, quality and thickness of the components for maximum economy, characteristics of different bottom components used.
Important point to be considered while cutting the bottom components, systematic cutting of different components from the appropriate portions of sole leather sides.
Preparation of bottom stock and the importance of correct preparation of bottom components. Sorting, splitting, insole preparation for welted shoes. Preparation of the toe puffs/stiffeners, tampering of bottom components and its effect on manufacturing processes. Leather unit soles (PVC coated)
6. Stamping and marking of cut components.
7. Economical methods of clicking and reduction in wastage.
8. Methods of estimating quantity of raw material required for upper lining and bottom component and calculation of upper cost.

UNIT-III

UPPER CLOSING AND FINISHING OPERATIONS

Upper closing: Checking of pairs and identification marks before commencing major operation in closing department.

Punching: To start the closing of components, decoration and punching.

Skiving: Close seam skive, under lay skive and turning in skive. Purpose and importance of skiving by hand and machine, their merits and demerits.

Edge treatment: Purpose and affects of edge treatment. Types of edge treatment. Raw-edge, burnished edge, folded edge, bound edge, gimped edge, slipbeaded edge and bagged edge.

Ornamentation and its purpose: Kinds of ornamentation - Fancy seam, multi seam, Braiding, corded seam. Ornamental lacing, stitching along edges. Embroidering and performing.

Reinforcements: Taping, backing, staying and stay stitching. Their purpose, importance and effects.

Jointing of upper and lining section for upper closing :

Different kinds of seam plain close seam, silked or open stirched seam, lapped seam use and importance in shoe upper closing. Types of stitches-lock, chain, and zigzag stitch. Difference in seam and stitch. Threads used in closing room.

Finishing operations: Cleaning, Edge beating, trimming, eyeleting and checking the quality of closed uppers, description and sequence of operations of upper closing of court shoe, Moccasin shoe.

Durby shoe and Oxford shoe. Machines and tools and devices employed in the upper closing department.

UNIT-IV

LASTING, MAKING AND FINISHING OF LEATHER PRODUCT

Lasting and Making: Preparation of awl. Types of stitches required for various purposes. Relation of awl stitches and threads to material and size of stitches. Principles of drafting and its importance in lasting of shoes of different constructions (Welted, welt shoes) welt attaching by hand and machine (staples shank fitting, bottom filling, sole attaching by hand and machine, bottom leveling, sole nailing.)

Modern methods of footwear construction including direct moulded, injection moulded and cemented unit sole: Purpose and relative merits of the various methods of footwear construction in relation to their use. Importance of conditioning, damping, mulling, heat setting and drying. Detailed study of cemented shoe construction. Adhesives and machines used in cemented construction.

Finishing: Upper leather dressing, cleaning and shoe lacing, Heel attaching and top piece attaching by hand and machine. Different types of edge trimming, fore part and waste trimming, heel scouring, heel front buffing, inking, edge setting by hand and machine, bottom buffing, bottom finishing, upper leather cleaning and dressing, fitting and sock, shoe lacing, checking and packing for different types of footwear. The aims and objects of finishing, their utility. The relation between heel pairing and heel scouring, edge trimming and setting, common faults in finishing.

Inspection recognition and elimination of faults. The use of heat and heat effects in shoe processes. Various tools, equipments and machinery employed for finishing. Their use and general maintenance. The vital parts of machines and their minor adjustments.

Material used for packing, individual and trend ship packing. Export packing, use of fungicides for export packing. Defect removing methods- such as wrinkles on lining twisted back strap, High and low quarters, Soft toe and back, soft stiffener etc.

UNIT-V

COMPUTER AIDED LEATHER PRODUCT DESIGN

Anatomy of human foot, Function of the foot, Foot comfort and Common foot abnormalities, Foot and Last measurement, Shoe sizing system and fittings. Designing and pattern making, Different types of footwear, Various components of footwear, Basics concepts of design and pattern cutting, Grading methods, Various allowances, Applications of computer aid designing, Materials of leather products- Selection of leather and non-leather materials for different components of footwear and garments. Basic methods of cutting different components, Tools and equipment for clicking, marking, skiving, edge Treatments, fitting, stitching and types of stitches, closing of simple uppers.

Different method of footwear construction, Cemented, Direct vulcanized, Injection-moulded, Veldschoen, Machine welted, Slip and sting Lasted, Finishing and Trimming operation, Classification of Leather goods, Type and selection of materials, Methods of construction, Tools and Machinery. Classification of leather, Material selection criteria for leather garments. Lining materials, Factors such as light weight, Porosity, Water absorption, Accessories metal fittings for garments, Designing methods, Various components, Preparation of Standards & pattern of Garment/Material.

Computer aided design, CAD, CPU, Data storage, Input/output devices, Function of CPU, Main memory and backup storage devices, Selection of Input/output devices, Operating system, Application of software for Footwear.