

## 5.1 LEATHER PROCESS TECHNOLOGY – I

L T P  
4 - 6

### RATIONALE

The study of practical aspects of leather manufacturing from different types of raw materials is extremely important for the students. The students must know the types of raw material available, their properties and grading. They should also know the properties of different types of leathers and should be able to device processes for their manufacture correlating the material, machine and technology. Diploma holders in Leather Technology are supposed to acquire knowledge of various steps involved in processing techniques for heavy and industrial leathers, sports goods leathers and various types of light leathers from bovine hides. This knowledge is very useful for maintaining global quality standards for leathers. For this purpose, it is essential that students should be given knowledge and skills for enabling them to perform effectively on the shop-floor of leather processing units. Hence this subject

### DETAILED CONTENTS

#### THEORY

1. Selection (5 hrs)  
Study of raw Cow & Buffalo hides and calf skins, their selection / grading as per end use.
2. General Tanning Practices (8 hrs)  
General practices in vegetable tanning. Manufacture of E.I. skins and kips - Pit tanning and drums tanning - Modern practices in E.I. tanning.  
General practices in chrome tanning. Manufacture of wet blue hides and skins.  
Wet white – properties & general methods of manufacture.
3. Sole Leathers (10 hrs)  
Vegetable tanned and Chrome tanned sole leathers. Water proofing of sole leathers ; Bag tanning of cattle and buffalo hides.
4. Industrial Leathers (10 hrs)  
Belting leathers, Picking band leathers, Diaphragm leathers, Apron leathers. Hydraulic and pneumatic leathers such as hand pump leathers, deep bore well leathers. Industrial Gloving leather from splits /grains

5. Sports Good Leathers (7 hrs)

Sports good leathers such as football, volley balls, hockey balls, cricket balls, etc. Glove leathers for wicket keepers, belting boxing etc. Harness, Saddlery leathers.

6. Light Leathers (18 hrs)

( From hides and calf skins)

Chrome tanned upper leathers: Full chrome / chrome retan upper leathers, Burnishable leathers, Printed, Dry-milled and Shrunken grain leathers, Suede & Nubuck leathers, White leathers, Water proof upper leathers, Lining leathers, Upholstery leathers, Grain & Suede garment leathers etc.

Dressing of E.I. kips into upper, lining, bags for leather goods. E.I. hides and their dressing into Kattai and Bunwar, Upper, Printed leathers,

7. Split Processing and Upgradation (6 hrs)

Split Shoe suede, garment suede, grain finished leather and specialty finishes. Processing technologies and finishing techniques specially suited for the purpose. Up gradation of lower ends for better utilization. Transfer foil, lamination techniques etc. used in split finishing.

## LIST OF PRACTICALS

1. Manufacture of some of the following industrial and sports good leathers  
Cricket and hockey ball, boxing gloves, wicket keeping gloves, industrial gloves, industrial belting from raw/wet blue/bag tanned hides & skin.
2. Manufacture of sole leather/insole / Harness & Saddlery leather
3. Practical exercises (in detail) involving dyeing, finishing and making of all varieties of leathers manufacturing. Students should undertake rigorous practical exercises on leather making involving some of the following type of processes from wet blue/E.I/Crust leathers and remaining should be studied during factory visit.
  - i) Clothing Leathers
  - ii) Antique Finish Leathers
  - iv) Softy Upper Leather
  - v) Corrected Grain Leathers
  - vi) Burnish Upper
  - vii) Split finishing
  - viii) Ammunition leather / Mining Shoe Upper Leathers
  - ix) Shrunken Grain Leathers
  - x) Aniline/Semi Aniline Finished Leather
  - xi) Two-tone Finished Leathers

- xii) Lining leather
- xiii) Suede Leathers
- xiv) Nu-buck Leathers
- xv) Upholstry Leathers

### RECOMMENDED BOOKS

1. An Introduction to Principles of Leather Manufacture by SS Dutta, Indian Leather Technologists Association, Kolkota
2. Theory and Practice of Leather Manufacture by KT Sarkar
3. Leather Technicians Handbook by JH Sharpouse, Lather Producers Association, Northampton, UK
4. Practical Leather Technology by T.C. Thorstensen, Robert E. Krieger Publishing Co., Florida
5. Lecture Notes on Dyeing and Finshing of Leathers by C.K. Rao & M.S. Olivannan
6. Lecture Notes on Leather by P.S. Venkatachalam, APO Publ.
7. Manufacture of Upper Leathers – D.H. Tuck, Tropical Products Institute, UK
8. Glove & Garment Leathers - Tropical Products Institute, UK
9. Sole & Other Heavy Leathers - Tropical Products Institute, UK
10. CLRI Process Bulletins on Upper & Lining Leathers, Glove & Garment Leathers, Sole Leathers, Industrial Leathers, Sports Goods Leathers, Hair-on Skins etc.
11. Fur Skin Processing – Harry Kaplan
12. Technical papers & seminar / workshop proceedings on cleaner leather processing
13. Technical Literatures from Various Leather Chemicals Companies

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	05	08
2	08	12
3	10	16
4	10	16
5	07	10
6	18	28
7	06	10
Total	64	100

## 5.2 LEATHER PROCESS TECHNOLOGY – II

L T P  
4 - 6

### RATIONALE

The study of practical aspects of leather manufacturing from different types of raw materials is extremely important for the students. The students must know the types of raw material available, their properties and grading. They should also know the properties of different types of leathers and should be able to device processes for their manufacture correlating the material, machine and technology. Diploma holders in Leather Technology are suppose to acquire knowledge of various steps involved in processing techniques for manufacture of various types of light leathers from sheep, goat & reptiles skins as well as fur skin processing . Students must be conversant with processing technique for upgradation of lower selections of leathers for value enhancement of leathers. The practical applications of cleaner leather processing for waste minimization and from environmental considerations have become very important. It is essential that students should be given knowledge and skills for enabling them to perform effectively on the shop-floor of leather processing units. Hence this subject

1. Selection (5 hrs)  
Study of raw goat & sheep skins, their selection / grading as per end use.
2. Finished Leathers and Composition of Finishes (5 hrs)  
Tanned leathers/semi finished leathers from skins: EI leathers; Wet blue-Wet white-properties of these leathers-description of their manufacture.
3. Finished Leathers from Goat Skins (12 hrs)  
Glace kid , Resin uppers, Glazed uppers, Lining leathers, Shoe suedes, Garment suedes.  
Details of processing techniques.
4. Finished Leathers from Hair Sheep and Wool Sheep Skins (12 hrs)  
Finished Leathers like Sheep Nappa, Suede Garments, Glove Leathers etc. from EI and Wet blue leathers.
5. Speciality Leathers (6 hrs)  
Exotic leathers, furs, Morocco, pleated leathers, book binding and chamois leathers.  
Reptiles leathers from Crocodiles, Lizards, etc. Dressing of fur skins.

6. Upgradation of Leathers (12 hrs)

Upgradation through special effects by Embossing, Snuffing & Buffing, screen and block printing.

Role of newer equipments like Roller coater etc in upgradation.

Methods such as oil pull up, waxy burnishable, crazy horse, antique grain, roller printing, tie and dye finishing etc.

7. Cleaner Leather Processing (12 hrs)

General concepts of eco-friendly processing of leathers with cleaner beam house operations, Chrome / mineral free alternative tanning system, processing leathers with cleaner post tanning and finishing operations.

### LIST OF PRACTICALS

1. Processing of the following leathers from wet blue & EI Sheep & goat skins:

- Goat Nappa
- Sheep Nappa
- Suede Garment
- Nubuck Garment
- Glace kid
- Glazed uppers
- Shoe suedes
- Lining leathers
- Glove Leathers
- Hair on tanned leathers
- Parchment
- Printed upper
- Chamois

2. Special Effects in Finishing of Leathers

- Special effects such as Oil pull up, two tone, Tie and dye and Embossing, Roller coating and other modern equipments.
- Split Finishing & Upgradation Techniques
- Antique effect , Brush off finish , denim jeans, double sided grain suede, twotone finishing, metallic finish and split lamination-foil finishes.

## RECOMMENDED BOOKS

1. An Introduction to Principles of Leather Manufacture by SS Dutta, Indian Leather Technologists Association, Kolkota
2. Theory and Practice of Leather Manufacture by KT Sarkar
3. Leather Technicians Handbook by JH Sharphouse, Lather Producers Association, Northampton, UK
4. Practical Leather Technology by T.C. Thorstensen, Robert E. Krieger Publishing Co., Florida
5. Lecture Notes on Dyeing and Finshing of Leathers by C.K. Rao & M.S. Olivannan
6. Lecture Notes on Leather by P.S. Venkatachalam, APO Publ.
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8. Glove & Garment Leathers - Tropical Products Institute, UK
9. Sole & Other Heavy Leathers - Tropical Products Institute, UK
10. CLRI Process Bulletins on Upper & Lining Leathers, Glove & Garment Leathers, Sole Leathers, Industrial Leathers, Sports Goods Leathers, Hair-on Skins etc.
11. Fur Skin Processing – Harry Kaplan
12. Technical papers & seminar / workshop proceedings on cleaner leather processing
13. Technical Literatures from Various Leather Chemicals Companies

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	05	8
2	05	8
3	12	18
4	12	18
5	06	10
6	12	20
7	12	18
Total	64	100

### 5.3 TESTING AND QUALITY CONTROL

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#### RATIONALE

Diploma holder in Leather Technology should have competency to analyze water, curing and pre-tanning process. The knowledge of pH measurement, degree of teenage and mineral oxide content is helpful in quality control of tanned leather for quality control. Physical testing help in analyzing quality of leather as per norms. The knowledge about some common instruments, which is necessary in routine working of tannery to create self-confidence in the students

#### DETAILED CONTENTS

1. Curing and pre-tanning chemicals including spent liquors (6 hrs)
2. Vegetable tanning materials and extracts (6 hrs)
3. Chrome liquors and Chrome Tanning Components (4 hrs)
4. Aluminum and zirconium tanning salts, pH measurements, indicators and their use in testing (6 hrs)
5. Vegetable, mineral and combination tanned leathers for characteristics like degree of teenage, mineral oxide, contents etc (6 hrs)
6. Physical testing of various types of leathers for tensile strength, elongation, dynamic water absorption, abrasion resistance, rub fastness, shrinkage etc (6 hrs)
7. Use of instruments such as spectrophotometer, colorimeter, ion exchange resins etc in testing of tanning chemicals (4 hrs)
8. Conservation of chemicals and water in the tannery (2 hrs)
9. Analysis of limed and pickled pelts and chemical testing of vegetable tanned /chrome tanned aluminium tanned/combination tanned leather (6 hrs)
10. Analysis of chrome leather and other mineral, tanned leather for chrome content and other mineral contents, total ash, oils and fats, pH of water soluble, hide substance, moisture (6 hrs)
11. Analysis of vegetable tanned leather, fixed tannis, water soluble and insoluble ash, degree of tannage (6 hrs)
12. Analysis of combination tanned leather for their constituents (4 hrs)

13. Quality control in leather processing, role of testing in process and quality control specification (physical and chemical) from various types of leather (2 hrs)
14. Restricted Substances in Leather, Regulations in different countries on these, REACH.

### **LIST OF PRACTICALS**

1. Analysis of sodium bi-chromate and chrome powder
2. Analysis of chrome leather and other minerals, Tanned leather for chrome content and other mineral contents, Total Ash, Oils and Fats, pH of water solubles, differential numbers. Hide substance, moisture etc.
3. Analysis of spent liquors
4. Analysis of vegetable tanning material extracts and spent liquors
5. Analysis of vegetable tanned leathers, fixed tannins, oil and fats, hide substance, total ash, water soluble and insoluble ash and degree of tannage
6. Analysis of combination tanned leather for their constituents
7. Students are required to visit:
  - a) Some tanneries having well equipped laboratories for testing chemicals and leather testing
  - b) Regional Extension Centre of CLRI at Jalandhar (Punjab)
8. Testing of limed and pickled pelt and wet blue leather
9. Testing of chrome tanned and other mineral tanned leather
10. Testing of vegetable tanned leather

### **Physical Testing**

11. Measurement of thickness, water absorption, apparant density, tensile strength, elongation at break and specified load, stich tear resistance, abrasion, shrinkages, water vapour, permeability, dry and wet rub fastness, shower proofing, flexural endurance, grain crack index.

NOTE: Samples taken for physical and chemical analysis of leathers should be in accordance with official specifications laid by Bureau of Indian Standards of sampling and analysis.



## **INSTRUCTIONAL STRATEGY**

Keeping in view the globalization of economy and the multinational culture in this country, it is imperative that the diploma holders have to match the quality of the products not only with national standards but, with international standards. While teaching this subject teachers should invite experts from the industry for extension lectures and expose the students to various national and international standards, relevant to different topics. Teachers should design tutorial exercises so that the students carry out some independent studies. Students should be taken to the industry to expose them to testing, analysis and quality control measures being taken in the industry. Student should be given independent practical exercises, which should be supervised by the teachers. Wherever possible, print and non-print media should be used to bring clarity, about various concepts and principles involved, in the minds of students.

## **RECOMMENDED BOOKS**

1. Analytical Chemistry of Leather Manufacture by PK Sakar – Indian Leather Technologists Association, Kolkota 1982
2. Official Methods of Analysis; Society of Leather Technologists and Chemists UK, 1981
3. Methods of Chemical Testing of Leathers IS: 18: 582 – 1970, Bureau of Indian Standards, New Delhi 1977
4. Fundamental Principle of Bacteriology by A McGraw Hill Book Company Inc. New York Toronto, London
5. An Introduction to the Principles of Physical Testing of Leather by SS Dutta, Indian Leather Technologists Association, Kolkotta 1991
6. Technological Controls in Leather Manufacture by S Bangaruswamy CLRK Publications, 1984
7. Methods of Physical Testing of Leathers IS 5914 – 1970 BIS, New Delhi
8. Inorganic Quantitative Analysis by Vogel
9. Acceptable Quality Levels in Leathers by United Nation Publications, New York, 1976

**SUGGESTED DISTRIBUTION OF MARKS**

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	12
2	6	8
3	4	8
4	6	8
5	6	8
6	6	8
7	4	8
8	2	8
9	6	8
10	6	8
11	6	8
12	4	4
13	2	4
'Total	64	100

## 5.4 ESTIMATING AND COSTING

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### RATIONALE

Knowledge of raw hides and skins, their availability, marketing, storing, packing and dispatch is necessary for Indian and Foreign trade of raw hides and skins. Terms associated with consumption, distribution, demand and supply, budget and revenue in relation to leather trade are useful to the students. Knowledge of book keeping and accountancy, material management and marketing techniques is an added advantage to the diploma student in the leather technology. Hence this subject.

### DETAILED COENTENTS

#### THOERY

1. Principle of Estimating (10 hrs)

Principles of calculating quantities of materials required for the manufacture of different types of footwear and leather goods, classification and distribution costs raw materials, labour, plant, overheads, wastes, packing and forwarding costs. Profit ranges allowances for fluctuation in rates. Calculation of the owning and operating costs of machinery - cost recoverable by disposing waste products - standard costing

2. Cost Estimation (8 hrs)

Estimation of the costs of manufacturing different types of leathers and processes involved in leather manufacture

3. Raw Hides and Skins (12 hrs)

- a) Price structure and marketing, foreign trade in raw hides and skins  
b) Different types of leathers, stores management, packing and dispatch

4. Elements of Economics (10 hrs)

Explanation of basic terms: consumption, distribution, goods, demand and supply, national income, national products, taxes, budget, revenue, expenditure etc. with reference to Indian economy

Elementary idea of demand analysis and forecasting, cost analysis and pricing

Time value of money-simple problems

Depreciation and its calculation

Investment appraisal, cost benefit and value analysis, Budgeting

5. Book keeping, maintenance of ledger, profit and loss accounts, balance sheet etc (8 hrs)
6. Principles of costs and accountancy, prime cost, working cost etc (8 hrs)
7. Costing of various types of leathers, import, export policies, Incentives, drawbacks (8 hrs)

### **INSTRUCTIONAL STRATEGY**

Since some of the diploma holders in leather technology are going to establish their own enterprise, so the teachers should give sufficient emphasis on developing skills in the students related to estimating and costing. Teacher should design tutorial exercises so that students are able to undergo drills of preparing detailed analysis of quantity, resources, costs, estimates and budgets. Students should also be given exposure to industries for exposing them to the system of packaging, storing and marketing the final products. Some software related to accountancy may also be demonstrated to the students.

### **RECOMMENDED BOOKS**

1. Business Organization and Management by MC Shukla – Sultanchand and Sons
2. Production Engineering and Management – McGraw Hill, 1984
3. Managerial Economics by RL Varshney and KL Maheswari – Sultanchand and Sons
4. Industrial Management by K Chellappan
5. Business Organization and Management by PK Gosh and YK Bhushan, S. Chand and Sons, New Delhi
6. Engineering Economics by R Panneerselvam; Prentice Hall of India Pvt. Ltd. New Delhi
7. Basic Managerial Skills for All by EH McGrath, S.J., Prentice Hall of India, New Delhi

### **SUGGESTED DISTRIBUTION OF MARKS**

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	16
2	8	12
3	12	18
4	10	16
5	8	12
6	8	12
7	8	14
Total	64	100

## 5.5 BASICS OF MANAGEMENT

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### RATIONALE

The diploma holders are generally expected to take up middle level managerial positions, their exposure to basic management principles is very essential. Topics like Structure of Organization, Leadership, Motivation, Ethics and Values, Customer Relationship Management (CRM), Legal Aspects of Business, Total Quality Management (TQM), Intellectual Property Rights (IPR) etc. have been included in the subject to provide elementary knowledge about these management areas.

### DETAILED CONTENTS

- |    |  |          |
|----|--|----------|
| 1. | Principles of Management   | (06 hrs) |
|    | 1.1. Introduction, definition and importance of management.  |          |
|    | 1.2. Functions of Management<br>Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling. |          |
|    | 1.3. Concept and Structure of an Organization  |          |
|    | Types of industrial Organization   |          |
|    | a) Line organization   |          |
|    | b) Functional Organization   |          |
|    | c) Line and Functional Organization  |          |
|    | 1.4. Hierarchical Management Structure<br>Top, Middle and Lower Level Management                                     |          |
|    | 1.5. Departmentalization<br>Introduction and its advantages.   |          |
| 2. | Work Culture   | (06 hrs) |
|    | 2.1. Introduction and importance of Healthy Work Culture in organization   |          |
|    | 2.2. Components of Culture   |          |
|    | 2.3. Importance of attitude, values and behaviour<br>Behavioural Science – Individual and group behaviour            |          |
|    | 2.4. Professional Ethics – Concept and need of Professional Ethics   |          |

3. Leadership and Motivation (06 hrs)
  - 3.1. Leadership
    - 3.1.1. Definition and Need of Leadership
    - 3.1.2. Qualities of a good leader
    - 3.1.3. Manager vs. leader
  - 3.2. Motivation
    - 3.2.1. Definition and characteristics of motivation
    - 3.2.2. Factors affecting motivation
    - 3.2.3. Maslow's Need Hierarchy Theory of Motivation
  - 3.3. Job Satisfaction
4. Legal Aspects of Business: Introduction and need (06 hrs)
  - 4.1. Labour Welfare Schemes
    - 4.1.1. Wage payment : Definition and types
    - 4.1.2. Incentives: Definition, need and types
  - 4.2. Factory Act 1948
  - 4.3. Minimum Wages Act 1948
5. Management Scope in different Areas (12 hrs)
  - 5.1. Human Resource Development
    - 5.1.1. Introduction and objective
    - 5.1.2. Manpower Planning, recruitment and selection
    - 5.1.3. Performance appraisal methods
  - 5.2. Material and Store Management
    - a) Introduction, functions and objectives of material management
    - b) Purchasing: definition and procedure
    - c) Just in time (JIT)
  - 5.3. Marketing and Sales
    - a) Introduction, importance and its functions
    - b) Difference between marketing and selling
    - c) Advertisement- print media and electronic media
    - d) Market-Survey and Sales promotion.

- 5.4. Financial Management – Introduction
  - 5.4.1. Concept of NPV, IRR, Cost-benefit analysis
  - 5.4.2. Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund
- 5.5 Maintenance Management
  - 5.5.1 Concept
  - 5.5.2 Preventive Maintenance
- 6. Miscellaneous topics (12 hrs)
  - 6.1. Customer Relationship Management (CRM)
    - a) Definition and Need
    - b) Types of CRM
    - c) Customer satisfaction
  - 6.2. Total Quality Management (TQM)
    - a) Inspection and Quality Control
    - b) Concept of Quality Assurance
    - c) TQM
  - 6.3. Intellectual Property Rights ( IPR)
    - 3.3.1. Introduction, definition and its importance
    - 3.3.2. Infringements related to patents, copyright, trade mark

## **INSTRUCTIONAL STRATEGY**

It is observed that the diploma holders generally take up middle level managerial positions, therefore, their exposure to basic management principles is very essential. Accordingly students may be given conceptual understanding of different functions related to management. Some of the topics may be taught using question answer, assignment or seminar method. The teacher will discuss success stories and case studies with students, which in turn, will develop appropriate managerial qualities in the students. In addition, expert lectures may also be arranged from within the institutions or from management organizations. Appropriate extracted reading material and handouts may be provided.

## RECOMMENDED BOOKS

1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7, West Patel Nagar , New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited , Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.
6. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill Book Company, New Delhi.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by DD Sharma, Sultan Chand and Sons, New Delhi.
9. Intellectual Property Rights and the Law by Dr. GB Reddy.
10. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.
11. Customer Relationship Management: A step-by-step approach, Mohamed & Sagadevan Oscar Publication, Delhi
12. Customer Relation Management, Sugandhi RK, Oscar Publication, Delhi.

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	06	15
2.	06	10
3.	06	15
4.	06	10
5.	12	25
6.	12	25
<b>Total</b>	<b>48</b>	<b>100</b>



## **PERSONALITY DEVELOPMENT CAMP**

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

1. Communication Skills
2. Correspondence and job finding/applying/thanks and follow-up
3. Resume Writing
4. Interview Techniques: In-Person Interviews; Telephonic Interview' Panel interviews; Group interviews and Video Conferencing etc.
5. Presentation Techniques
6. Group Discussions Techniques
7. Aspects of Personality Development
8. Motivation
9. Leadership
10. Stress Management
11. Time Management
12. Interpersonal Relationship
13. Health and Hygiene